CASTH STEA

CITY OF BRADFORD EDUCATION COMMITTEE.

TECHNICAL SCHOOL.

DESIGN BOOK.

179

1. V. STAUB.

CITY OF BRADFORD TECHNICAL COLLEGE.

STANDARD WEAVE SHEET

No. 1.

The Mary Ann Beinecke Decorative Art Collection

STERLING AND FRANCINE CLARK ART INSTITUTE LIBRARY

A.1465—1,000.

City of Bradford Education Committee

No. 337

Technical College—Department of Textile Industries.

1912 —— 1913.

DESIGN BOOK.

Course of Study Cloth Structure. 2nd Year.

Weaving & Designing.

Name Fred. Vivian Stamp.

A 8975—200

Lecturer – Mr. Midgley

NK8805
58
v.1
RARE BOOK

1977 Bequest

Cloth Structure Lecture No 1.

Oct. 2nd 1912

Revision of Standard Weave Sheet.

Weave No 1. This simple weave goes by several names but is generally called plain weave. Other names are "Oxford" weave (Bradford term) – "Tabby" weave (a Leeds appelation) + "Melton" weave (a name used in the woollen trade). The effect of this design is only as shown on the point-paper, when the counts + set of warp, + of weft, are alike. If, say, the wp. is white + has a set of 60 ends per 1", + the wf. is black + has a loom setting of 16 pks. per 1", then the face of the cloth would be all white, + weft would be totally hidden.

Weave No 2. This is a 2/2 warp rib structure; i.e. only warp is to be seen on the surface of the fabric woven in this design. This weave when applied to suitable warp + weft conditions, produces a poplin structure.

Wv. no. 3 2/2 Weft rib. In this structure only weft is to be seen on the surface of the cloth.

Wv. no. 4. 3/3 Weft rib.

Wv. no. 5. 4/4 Weft rib.

Wv. no. 6. 6/2 Warp rib.

Wv. no 7. This is a weft rib style.

Wv. no 8. This is a 4/4 Wp. rib modified.

Wv. no 9. This is a combination of 3/3 wp. rib + 3/3 wf. rib.

Wv. no 10. This weave is really weave no. 4, tightened by the

Lect. No 1 (Cont.)

introduction of more interlacings which, however, do not interfere with the 3/3 weft rib appearance of the surface of the fabric.

Wvs. no. 11 + 12 These are used in the production of "Corduroy" cloths.

Wvs. no. 13 + 14, Two "Soleil" weaves

Wvs. no. 15 + 16 Are called respectwely 2/2 + 3/3 hopsack, 4, in the Woollen trade, 4-end mat + 6-end mat.

Wv. no. 17 This weave gives the appearance of 2/2 hopsack on the face, + plain weave on the back. It is very useful for tightening up any loose 2/2 hopsack cloth without altering the face appearance.

Wv. no. 18 This is 4/4 hopsack.

Wvs. no 19 + 20 are broken hopsacks.

Wvs. no 21, 22 + 23 are Mock gauze weaves.

Lecture No. 2. Oct. 9. '12

The Origination of Small Weave Effects.

There are 10 methods of originating small weave effects the resultant effects being known as :—

1. Development of plain weave,

P.T.O.

Standard Weaves.

1.

2.

3.

4.

5.

6.

Developments of Plain Weave.

Lecture I.

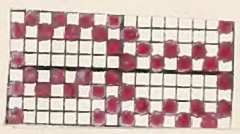
Also No II.

7.

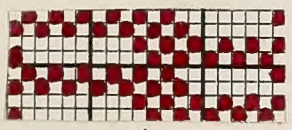
8.

9.

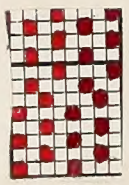
10.


11.

Weaves I to XXIII


12.

13.

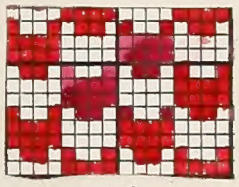

14.

15.

16.

17.

18.


19.

20.

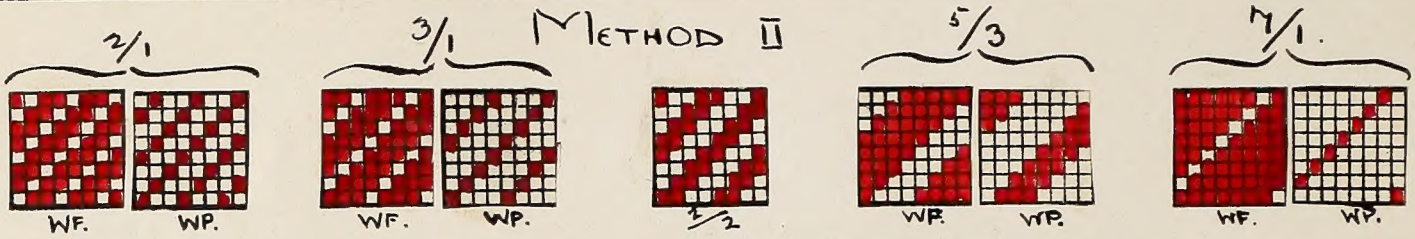
21.

22.

23.

Sect. 2. Small Weave Effects.

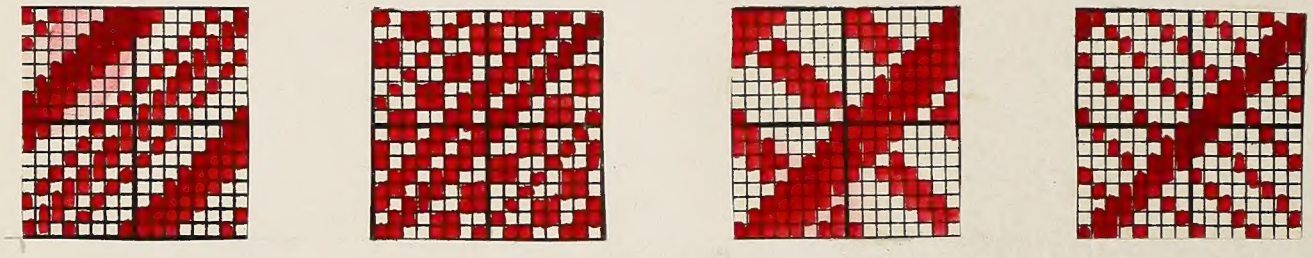
Method II



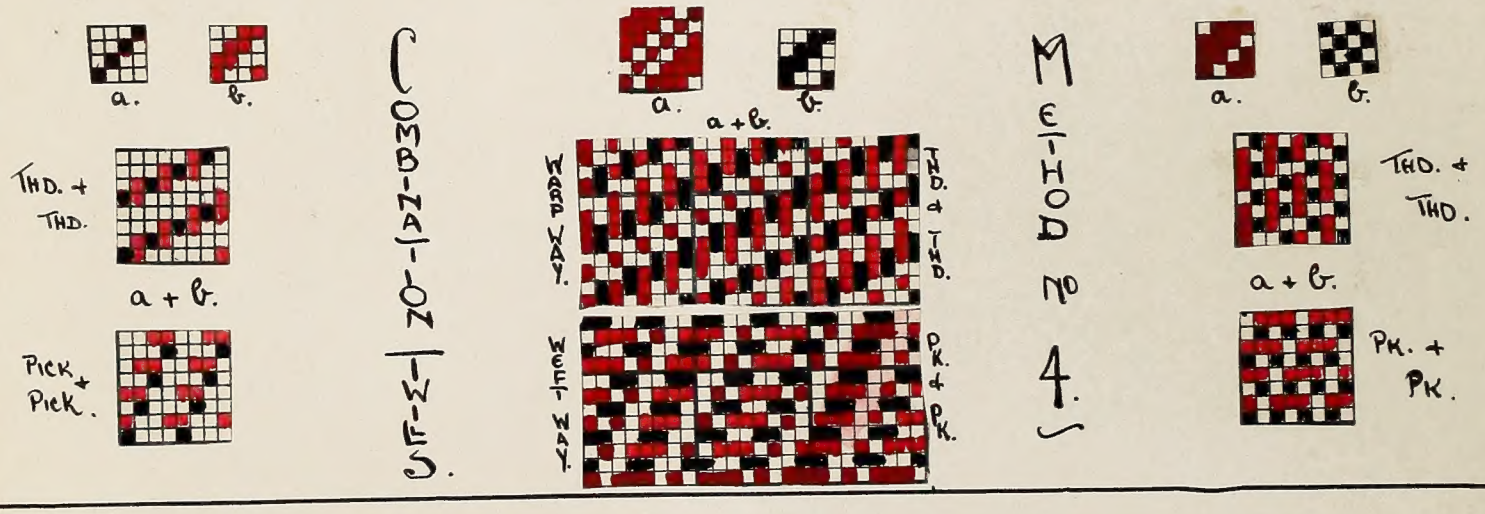
II. Ordinary Twills.

Method III

III. Compound Twills.



Method No 4.



Lecture II. (Cont.) Origination of small weave effects (Cont.)

2. Twills.
3. Compound Twills.
4. Combination Twills.
5. Satteens.
6. Satteen Dirivatives.
7. Satteen Re-arrangement of Twills.
8. Broken Twills
9. Crêpe weaves.
10. Armure Effects.

Weaves 1 to 23 on "The Standard Weave Sheet" are nearly all developments of plain weave.

Wvs. 24 to 38 are twills.

" 24 is much used in the making of Gaberdine cloths, +, with the usual conditions of warps. + 60 pks. per 1", produces an upright twill!

" 25 is used to make Cashmere dress fabrics, + the characteristic low angle of twill is got by putting more picks than warps. per 1" in the cloth!

" 26, 3/1 warp twill

" 27 to 31 are weft twills, much used to produce lustre cloths (principally linings) with Cotton warp + Mohair, Alpaca or other lustrous material for weft

" 35, 36 + 38 are also weft surface weaves + put to the same uses as wvs. 27 to 31.

" 32 is a 2/2 twill, probably the most used of all weaves.

" 33 = 3/3 twill. Weave 34 = 4/4 twill.

" 37 = 8-end diagonal

" 39 = is a broken twill, — weave 32 broken up into series of 2 warps.

" 40 is also a broken twill. W. 41 = 3/3 twill broken.

Lecture 2 (Cont.)

Wvs. 45 to 49, on the "Standard Weave Sheet" are also Broken Twills.

Wvs. 42, 3 + 4 are Herring Bone styles.

Wvs. 50 + 51 are used for Whip cord dress fabrics + are most suited to a structure where there are more Ends. than Pks. per 1"

Wv. 52 is a Crêpe weave.

Wv. 53 is called a compound twill, being composed of twill Hopsack + 2/2 twill.

Wv. 54 is a Combination twill, made from 2/2 twill + 3/3 twill combined pk. + pk.

Wvs. 55 to 64 are known as Satteens.

Wv. 55 Warp Satteen } sometimes called "crowsfoot" weaves. (4-end)
Wv. 56 Weft " }

Wvs. 57 + 8 are respectively 5 end warp + weft Satteens. The 5 end Warp satteen is extensively used to produce Covert Coatings + Amazon dress fabs., the upright twill necessary, being got by putting more Ends. than picks per 1" in the piece. The weft satteen is used in all Italian lining cloths, with more pks. than Ends per 1" in. In warp-faced cloths inferior weft is sometimes used because it does not show on the surface, but if the weft be too inferior + consequently weak, then serious faults may occur in the piece owing to broken (or missing ends) picks, which show very much in this weave as a miss-pick means a 9-float of warp every 5 ends as far across the piece as the pk. is missing.

Wv. 66 is extensively used instead of 57, + indeed, adapts itself better to poor weft as a broken pick is hardly perceptable.

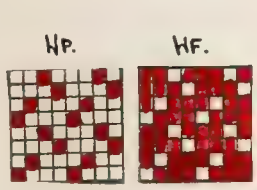
Wvs. 59-60 are 6 end satteens on different footings.

Wv. 61 gives an upright warp twill (bolder than 57) when applied to Covert Coating styles.

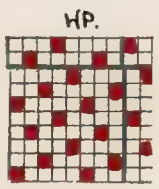
Wvs 62 + 3 are 8-end satteens + Wvs 64 + 5 are irregular 8-end

P.T.O.

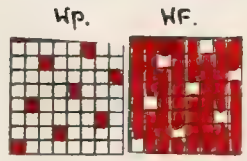
Sect 2. Small Weave Effects.



4-end.

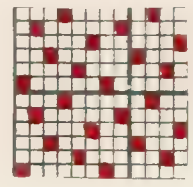


5-end.



8-end.

8-end.



6-end.

Method V. Satteens.

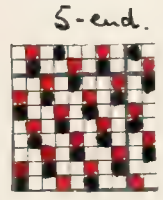
7-end.

7-end.

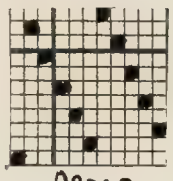
8-end

8-end.

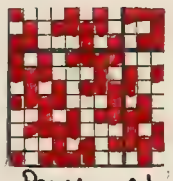
7-end


5-end.

Method VI Satteen Derivatives.

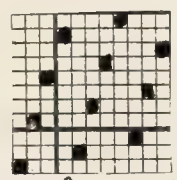

Order.

1.

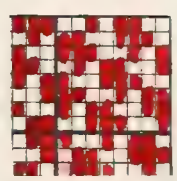

Rearranged Design.

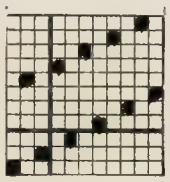
11 end Weave.

4 Satteen Re-arrangements Possible.


Order

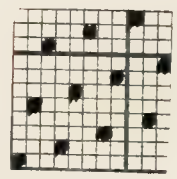
2.


Design.


Order.

3.

Design.

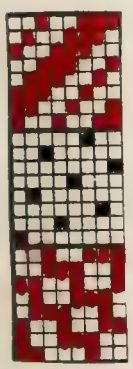

Order

4.

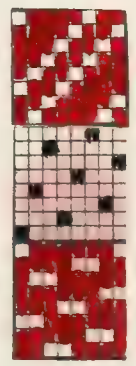
Re-arranged Design.

Method VII.

Satteen Re-arrangement of Twills



8-end.



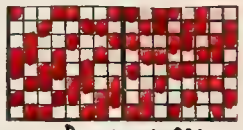
8-end.

Lecture II

Base.

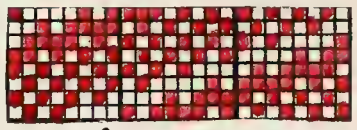
Base.

Base.


Permutation.

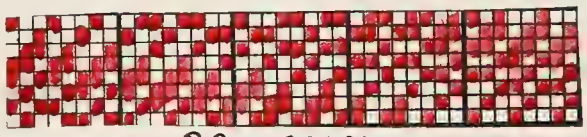
Per.tn

Permutation.


Combination.

Per.tn

Combination.


Permutation.

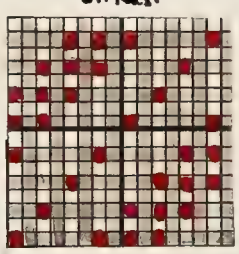
Method No 8.

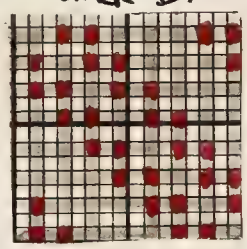
Combination.

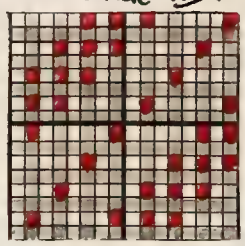
Broken Twills.

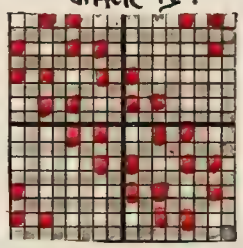
Some Small Weave Effects.

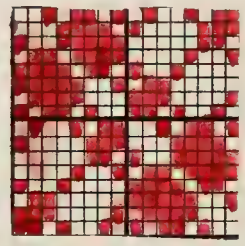
Base.


Stage I.


Stage II.


Stage III.


Stage IV.

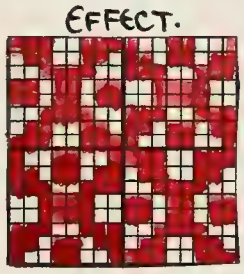

Effect.

Base

Crêpe Weaves.

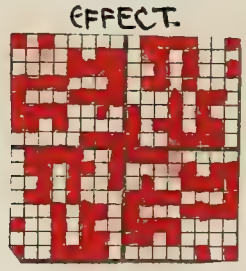
Base.

Effect.



Method 9.

Effect.



Lect. 2. (Cont.) **Standard Weaves (Cont.)**

Sateens. These 8-end sateens are rarely used for weaves, but are often used as a basis of arrangement for figures.

Nos. 66 to 92 are Sateen Derivatives

" 66 = 5-end with dot added.

" 67 = 5 end with dot added.

" 68 = 61 " " " .

" 69 = 7-shaft corkscrew (i.e. gives warp ribs at a low angle) + is made by adding 2 dots to the 7 end Sateen.

" 71 gives an upright warp twill effect + is known as a Venetian, when set in loom with more ends per 1" than picks.

" 73 = Twill Hopsack

" 74 = Mayo Twill.

" 76 = 9-shaft Corkscrew.

" 79 = 10-end Venetian.

The methods of originating small weave effects will be found illustrated with designs on the mounting sheets.

Lecture 3. Origination of Small Weave Effects. Oct 23rd '12.

Nrs. 69, 76, 86 + 91 (on standard weave sheets) are all corkscrews, no. 91, the 13-shaft corkscrew, being the most popular. A low L of twill in a corkscrew cloth generally denotes good quality, for the low L is produced by putting a greater no. of pks. per 1" in the cloth than Ends. per 1". This can only be done with fine yarns, + fine yarns are only to be made successfully from good quality raw material; thus, a low L denotes good quality stuff.

Nr. 73. This is known as the twill hopsack weave. If it is applied to a square cloth the result is :—(a) hopsacks of weft on the surface, + of warp on the back, at an L of 45°. (b) When applied to a suitable make of cloth, the weave gives a "pin-head" effect, in which the hopsacks become diminished + the single 3 floats of warp are developed.

When applied to these particulars the effect is as (a.)

	Warp.	Weft.
(a)	2/40's Botty. 64 Ends per 1".	1/20's Botty. 64 pks. per 1".

Effect (b) —"pinhead"— is produced by following particles.—

	Warp.	Weft.
(b.)	2/40's Botty. 80 Ends. per 1"	1/20's Botty 50 pks. per 1"

Nr. 80. This is the same weave as no. 66.

Nr. 81. This weave is used, like 73, to get pinhead effects.

Nrs. 83, 84 + 85 Are all based on the 5 end sateen, + repeat on 10 Ends. + picks.

Nr. 87. This is known as a "Barathea" weave, +, when applied to the following loom particulars, gives an absolutely 1st class dress fabric, with splendid draping qualities, because two of the best + most elastic of textile materials (Botty + silk) are used to make it.

Particulars. Pure net silk warp, with 70 to 80 ends per

Lecture II.

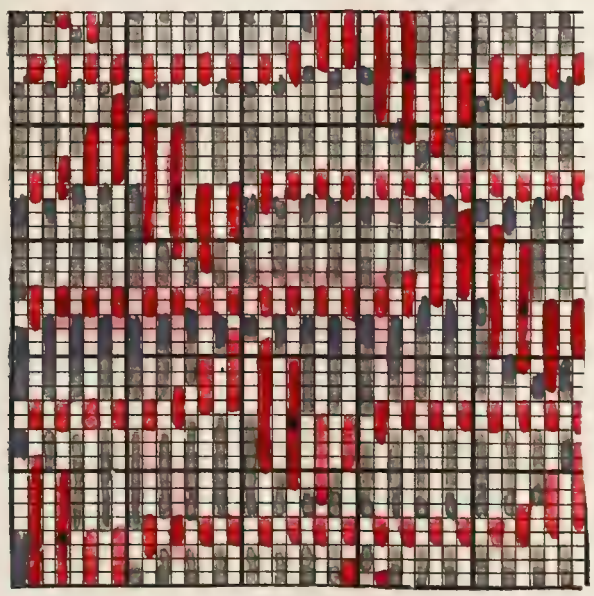
In 4-end Satteen Order.

Method 10.

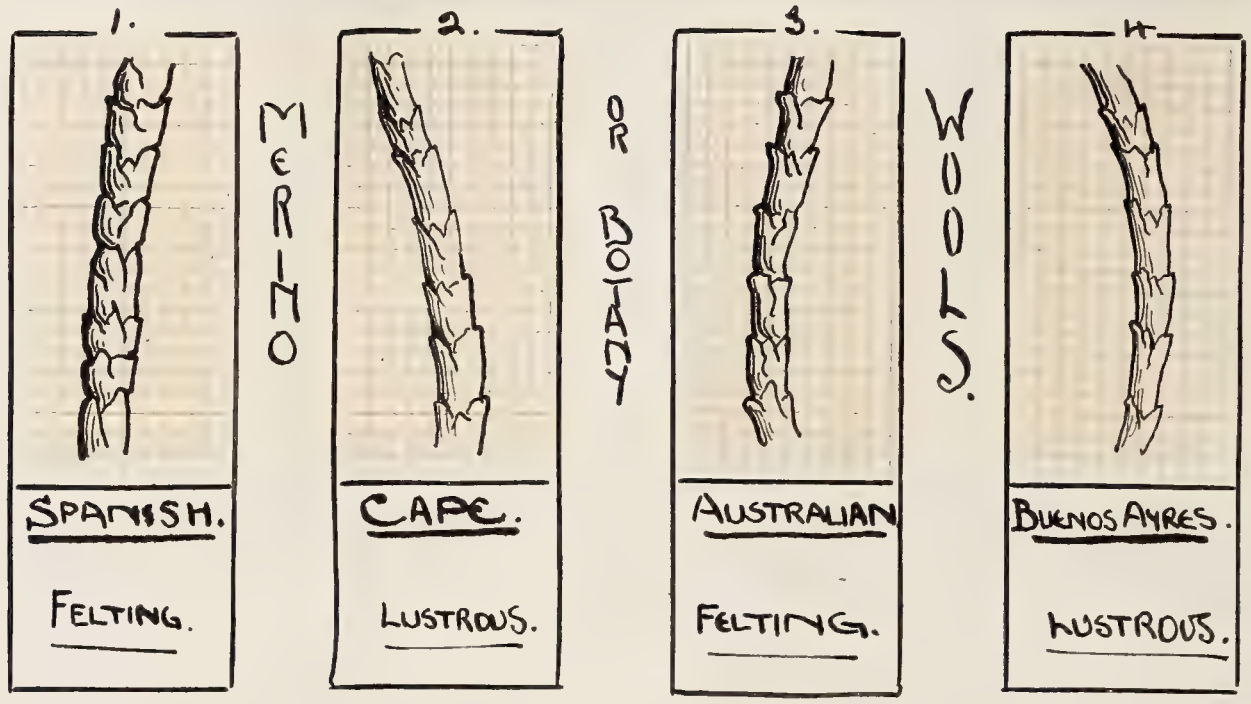
Armure Effects

Small Weave Effects.

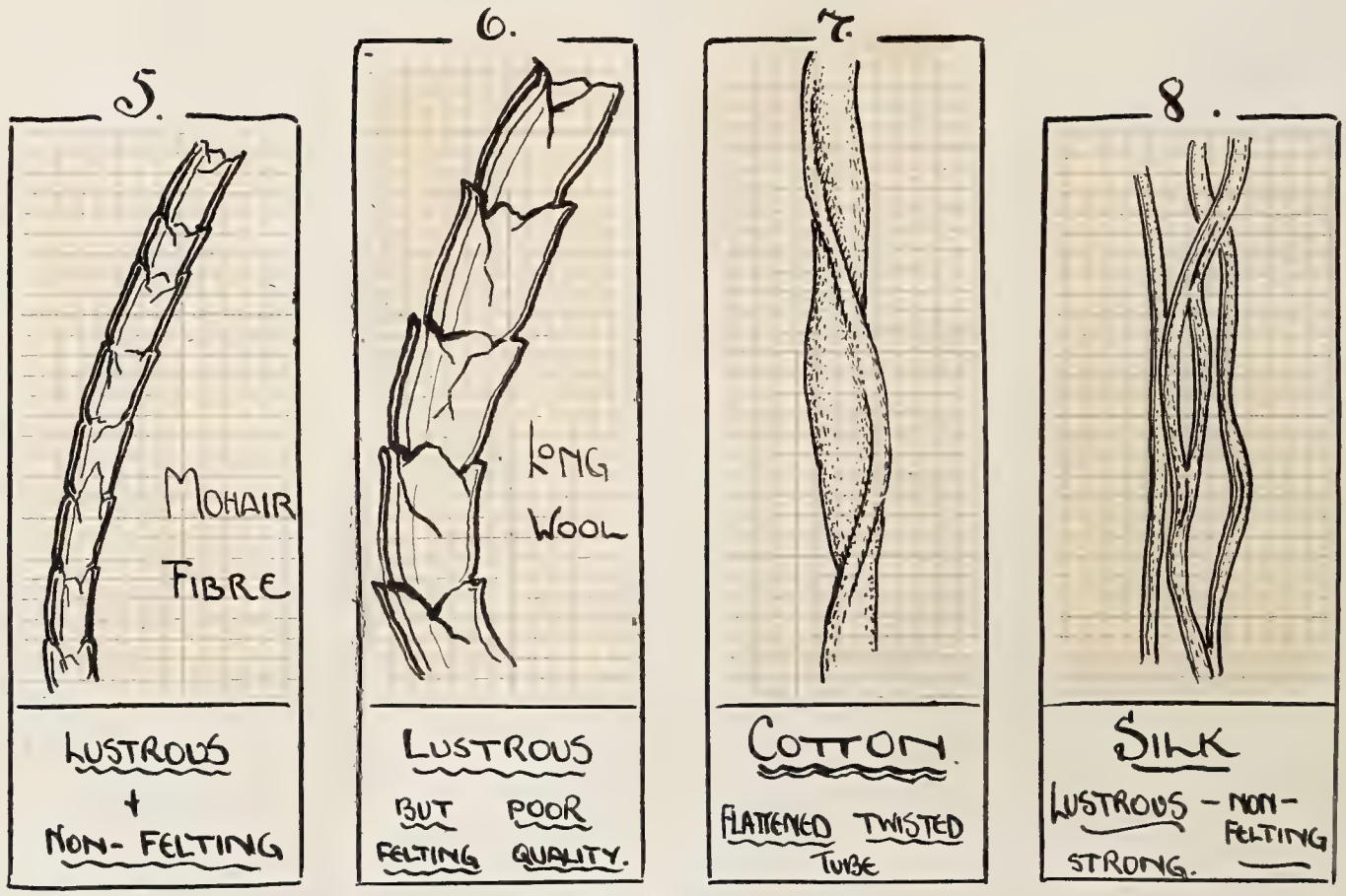
In 5-end Satteen Order.



Lecture 4.



Varieties of Fibres.



Lect. 3 (Cont.)

1". Weft of 1/40's to 1/90's Botany yarn, with 200 to 300 pks. per 1".

It will be seen that the cloth is a close-woven, tight structure. This is responsible for the fact that the cloth is not made much (or at all) nowadays, for dress goods, to "go", have to be of a "voile" or more or less open structure nowadays.

Wvs. 88 + 93 are known as "Crêpolines", + are made by breaking up $\frac{1}{2}/\frac{1}{2}$ warp rib.

Wv. 89. This is a very good crêpe for the ground in figured styles.

Wvs 94, 98, 100, 101 + 102 are weaves without any base of construction.

Wvs 95, 97 + 99 are small weave check effects.

Wvs 103, 104, 105 + 106 are known as "Honeycomb" weaves.

Wv. 107 is an "armure" effect.

Addendum to Lect. 2

The Satteen Re-arrangement of Twills.

Very useful small wv. effects can be produced by this method. The idea is to re-arrange the thds. of any ordinary twill in a satteen order. Examples are shown on the mounting sheets.

Lecture 4. Oct. 30th '12.

Styles + Qualities of Worsted Fabrics.

The quality + style of a fabric depends upon, to the greatest extent, the fibre it is composed of, + its properties, qualities etc.

Varieties of Fibres

(1) Long Wool. This material has a harsh handle, + is not at all inclined to shrink. The fibres are coarse (usually), but very lustrous, having very few cup-marks or serrations to the 1", as compared with, say, the Merino fibre. (Note. The fewer scale marks, + the more light is deflected, + less absorbed) Long wool is only used for low class coatings, + low goods generally.

(2.) Merino Wool. This fibre is not so lustrous as (1), but is finer, shorter, shrinks more + has more felting property. It has also an infinitely superior handle to (1) + is much more valuable. The great no. of serrations on the fibre make it felt (i.e. interlock or adhere) very well, + thus fine counts are easily spun. The 1st class Merino hails from Australia principally, + produces fine soft handling Cloths, as the fibre felts + shrinks well.

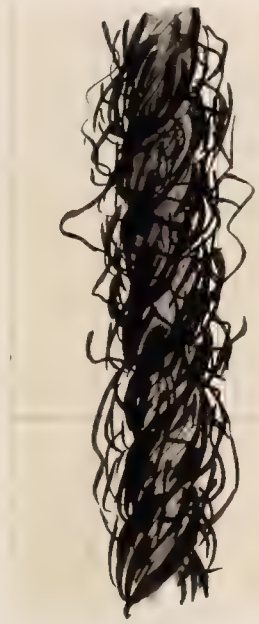
(3) Silk. This is the strongest + most elastic + lustrous of all Textile fibres, + thus has unparalleled qualities for use as a drapery cloth.

(4) Cotton – is a non-lustrous, non-heat-conducting vegetable fibre, which, under the miscroscope presents the appearance of a flattened twisted tube. The twists are the surface marks which make for non-lustre

East Indian cotton averages ½" in length + is a poor quality, but Sea Island cotton averages 2" in length + is the best quality. Short cotton cannot be combed, + ∴ can only be made into "carded" yarn, i.e. yarn made on the Woll principle.

Cotton of good quality (e.g. Sea Island) can be made lustrous when in the form of yarn or cloth by "mercerizing". During this process the cotton yarn or cloth

P.T.O.



2 TYPES OF YARN STRUCTURE

WORSTED.

WOOLEN.

LECTURES 4 & 5.

GENERAL CLASSIFICATION OF WOOLS EMPLOYED IN WORTD TRADE

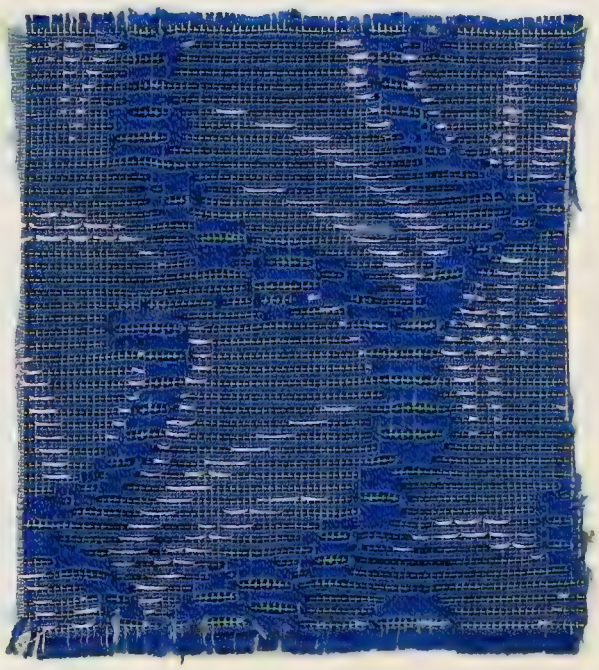
TYPE OF MAT'RL.		TOP-MAKERS' QUAL.	LENGTH OF COMBED FIBRE. EXTREMES.	LENGTH OF COMBED FIBRE. AVERAGE.	DIAMETER	CRIMPS PER ONE INCH.	SCALES per 1".
SHORT WOOL.	MERINO OR BOTY.	60's AND UPWARDS.	2" to 5"	4".	1/1000" to 1/	16 to 36	4.800
MED. HOOL.	CROSS-BRED	40's / 50's	6½" to 9"	7½".	1/750" to 1/1000"	8 to 6	2.500
(a) LONG WOOL.	X-BRED.	40's	4½" to 10½"	9".	1/500" to 1/800"	STRAIGHT	1.000.
(b) LONG WOOL.	ENG. LINCOLN.	36's	9½" to 14"	11".	1/500" to 1/800"	ST.	800.
(c)	MOHAIR.	/	5" to 10"	8".	1/800"	ST.	700.

"A" RIBBED STRUCTURES. "A"

No 1.

ARMURE

EFFECT.



No 2.

RIB

STRUCTURE

IN

SILK +

COTTON

3

COTTON

&

SILK

is treated in a solution of Caustic Soda +, at the same time, Stretched. This gets rid of all twists in the fibre, + thus makes it lustrous. Stretching is essential in this treatment, so shrinking + mercerizing of cotton yarns or cloths cannot be obtained together. Poor qual. cotton (e.g. East Indian) cannot be mercerized, as it is spun on the Woollen principle (interlocking + twisting in all directions) + thus longitudinal strain (stretching) cannot be put on the fibre to eliminate twists, during the Caustic Soda bath application.

(5) Noils. There are as many qualities of noils as wools combed, + these may be put in 4 classes for convenience :- (1) up to 36's, (2) up to 50's, (3) up to 68's, + (4) over 68's. 1st Class Worst Fabs. are composed of noil mostly — the lower the quality of the yarn + the less noil is used + more re-manufactured fibres.

(6) Shoddy is made by tearing up soft Wo + Worst goods. The softer + looser woven the goods + the less damage the fibre sustains in tearing up. Hard woven goods produce poor material.

Good qual. shoddy is made from good qual. loose fabrics (knitted generally.)
Med. " " " " " " Med. " Wo + Worst cloths. (fairly loose.)
Low " " " " by tearing up hard woven (hardy) Wo + Worst fabrics.

7. Mungo. This can be defined as a low shoddy, + is used in the making of low qual. woollen cloths.

Lecture 5. The Various Structures of Yarns.

All spun Fabs. are built upon the Wo or Woll. principles. Wo yarns made from English or Cross-Bred wools are either cap or fly spun. (Note. Ring-spinning is being introduced now, though.) Cap spinning is the cheapest + quickest method, but the yarn produced is not so well made or perfect in form, as that spun on the flyer frame. A cap spindle goes at 7,000 revs. per minute, but a flyer spindle only does half that (3,500) + thus produces a more even, more lustrous + altogether better spun yarn than the Cap

spinning frame. The latter produces a harder spun yarn, the greater no. of turns per 1" being required to get solidity. A ring-spun yarn is a sort of intermediate between the cap-spun yarn + that produced on a flyer-frame. Botany yarns are all either cap spun or mule spun. A mule spun yarn can be defined as 13 parts Wo + 1 part Worst, as it goes through all the first 13 Wo processes up to the actual spinning frame, which is this case is the mule, which is really worked on the Worst principle. Union yarns are yarns composed of 2 or more different materials. Some so-called Woven yarns are composed very largely of Cotton fibre which is scribbled with the re-manufactured wool fibre to increase the spinning property of the thread, which is really a union yarn. Cotton + Wool fibres + yarns are often combined to give effect (see check pattern in grey + black). Cotton yarns are known as "combed" or "carded" yarns. A "combed" cotton yarn is made on the Wo. principle, + ∴ only good, long-fibred cotton can be used. Carded Cott. yarns are made on the Worst. principle, generally from low-quality, short-fibred cotton.

Varieties of Colouring.

(Wo.) Mixture yarns. These coloured yarns are more expensive than solid colour yarns, + are obtained by combining 2 or more colours of fibre, which are thoroughly mixed during the drawing processes. In making a Woven mixture yarn the fibres of various colours are mixed when in a loose state.

Piece Dyeing – This is the cheapest method of obtaining colour on a fabric.

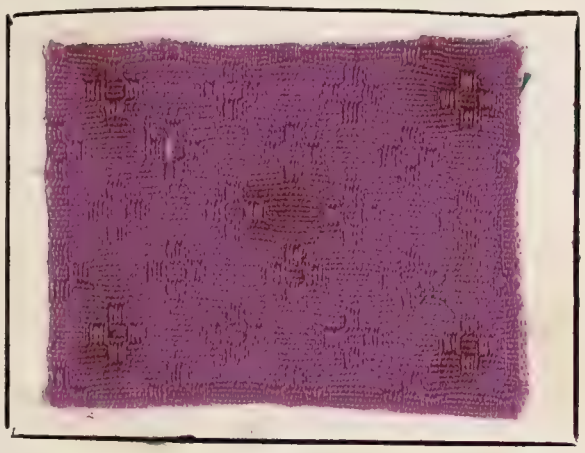
Cross-Dyeing. Example of cloth to get colour on which, it is necessary to resort to cross-dyeing.

2/48's Warp { cotton / Wo. } mixed Weft. 1/30's Boty.

Weave = Lend Sateen

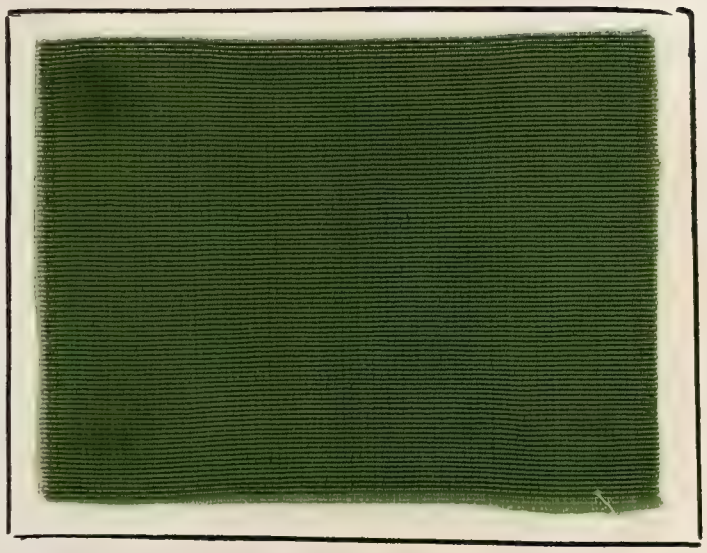
80-90 Ends. per 1". 60 pks per 1".

The cloth is first placed in a vat of wool dye, + then treated, afterwards, with cotton dye. The 2 processes are necessary as the wool dye does not affect the cotton in the cloth, + the cotton dye does not affect the wool in the fabric, + no dye can be used to colour wool + cotton at the same time + so



No 1.

BOTANY
&
MOHAIR.



No 2.

COTTON

RIB.

SEE No 3 ON LAST PAGE.

SAME
BUT
WITH

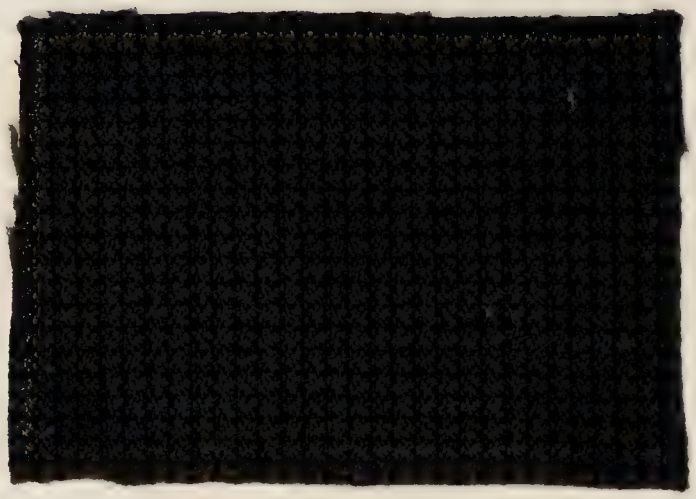
PURPLE

WP.

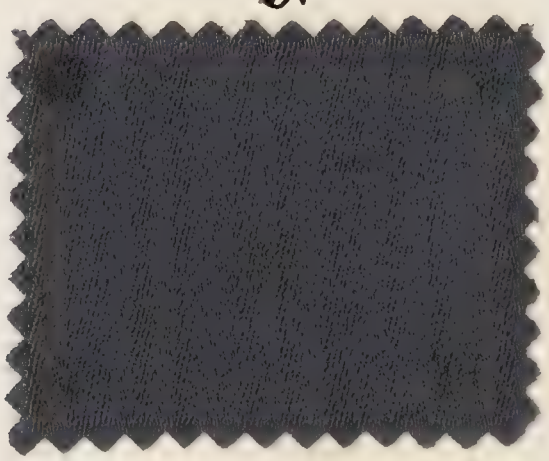
"C." All-Botany Fabrics.

1.

2.



3.



4.

5

FACE.

BACK.

6.

FACE.

BACK.

Sect 5 (Cont.) Varieties of Colouring (Cont.)

the same degree, as such a dye is non-existant at present.

Marl Mixture yarns. The various coloured materials, used to make these yarns, are mixed in the later drawing processes, in order to get irregular (not absolute, that is) mixing, which give the desired effect. For instance a grey mixture yarn of the "Marl" type would show patches of black & white.

Printing. This method is often resorted to, to get colour on to yarns, & also on to fabrics. On a printed thread, the colour appears intermittantly.

"Chlorinating". A typical example of a cloth, in which we get chlorinated yarns, is as follows:-

Warp.	Weft.
44 Ends $\frac{2}{48}$'s Botany (ordinary)	$\frac{1}{24}$'s Botany.
44 Ends $\frac{2}{48}$'s Botany. (Chlorinated)	(ordinary)

Weave = $\frac{2}{2}$ twill. 64 Ends & Picks per 1". $\frac{2}{2}$ twill.

When this cloth is subjected to a piece-dying (say Navy Blue), the chlorinated yarn resists the dye to a large extent & thus takes on a light bluish tint, whilst the Botany (ordinary) yarn takes the proper navy blue colour; the effect in the cloth is that of dark & light narrow stripes.

Dye resist threads. If, instead of Chlorinated Ends., Dye Resist threads (of any colour), had been used in the above example, the other yarns being white, & the piece then dyed some other colour, these Dye Resist threads would still have retained their original colour, as the "DYE-RESIST" is impervious to the dyes used in piece dyeing.

Lecture 5. Examination of various Patterns

Illustrating Varieties of structures, yarns, colours etc.

Pattern I. This is a first-class light-weight coating made from Wo yarns of mixture colouring. Mixture coloured yarns are more expensive than solid coloured ones. The mixture effect is got by combining 2 or more colours of fibre which are thoroughly mixed during the drawing process. (In Wsd. mixture yarns the loose fibre is mixed in the required proportions.)
Warp + Weft both 2/fold Botany.

Patt. II. Another Wo coating – fairly light in wght. – rather hard + boardy handle – wp. + wf. both 2/fold. Solid yarns. Botany.

Patt. III } 2 patterns, differing only as regards colour, of an all
Patt. IV. } Botany costume cloth – piece dyed – stripes of a shadow type being produced by right + left-twisted yarns. Warp + weft both single yarns.

Patt. V. This is a warp backed cloth. In weaving this cloth 2 warps are used, but only 1 weft. Weft = single Boty yarn, + the warps are both of 2/fold Boty yns.

Patt. VI. Double cloth – 2/fold wp. + wf. – 2/2 twill face + back – Boty. yarns. 2 warps + 2 wefts are used in making this cloth.

The above are all all-wool fabs. see mounting-sheet "C".

Rib Structures – see sheets "A" + "B".

Patt. I. This is an Armure Dress Fabric, being a warp-rib structure.
Warp = 1 thd Boty (2/fold) + 1 thd Mohair (2/fold) Weft = 1 Boty (single yarn)
Mohair only shows on surface. Piece-dyed.

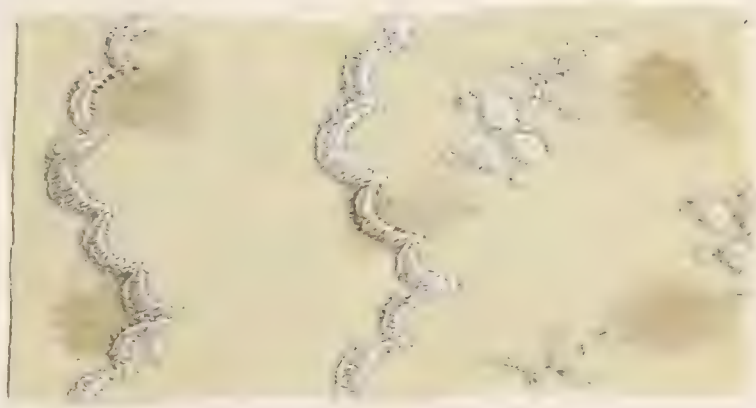
Patt II. This ribbed-style is composed of a wp. of silk + cotton, + weft of the same ~~(colour)~~ materials.

Patt. III } This is a silk-faced rib-structure, with a warp of cotton + silk, +
Patt. VI. } an all silk-weft. The only difference between pat's. 3 + 6 is

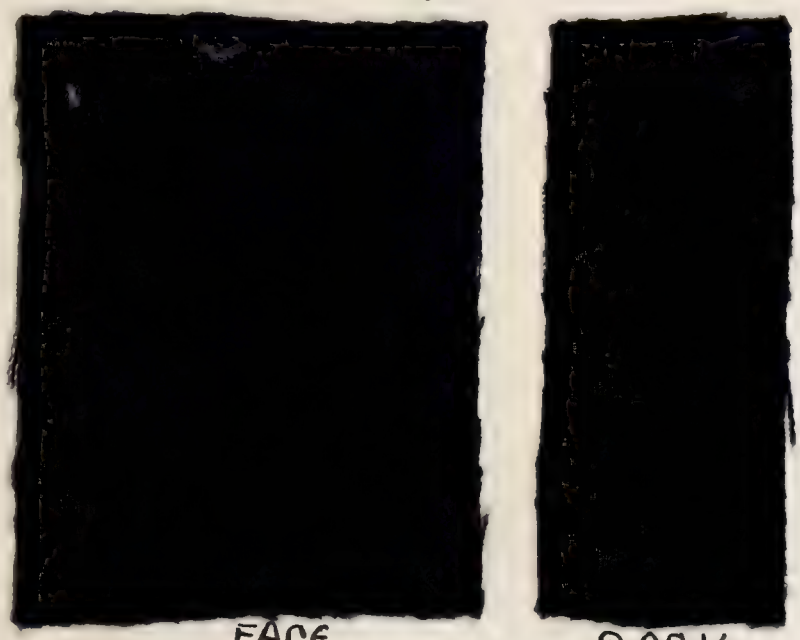
"D." ALL-WOOL FABRICS.

1.

2.



3.

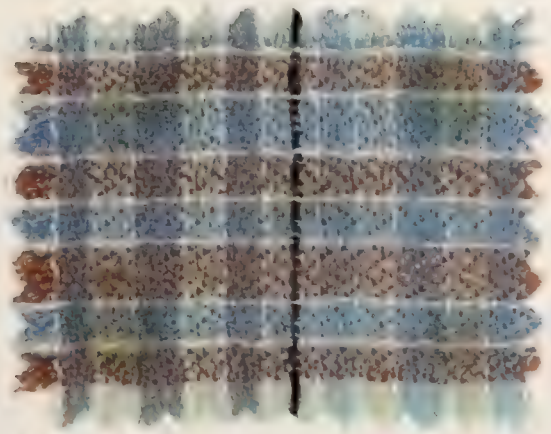


FACE. BACK.

4.

FACE. BACK.

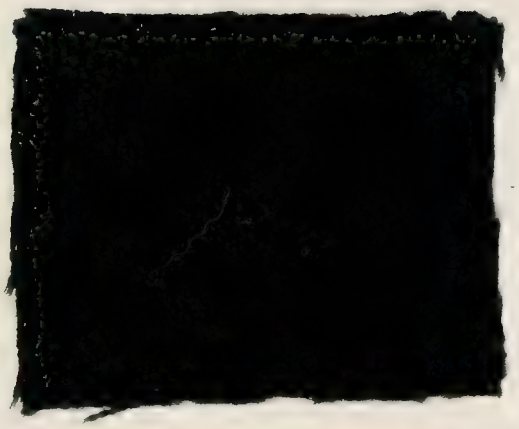
5.



All-Wool Fabrics.

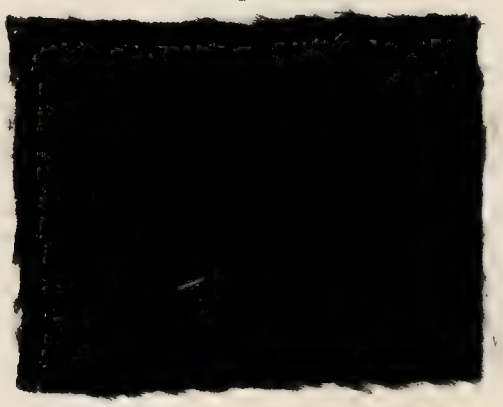
"I"

1.

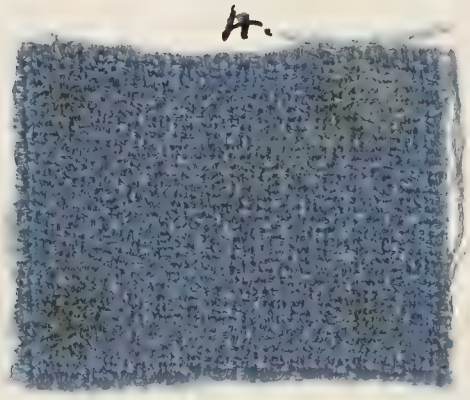


2.

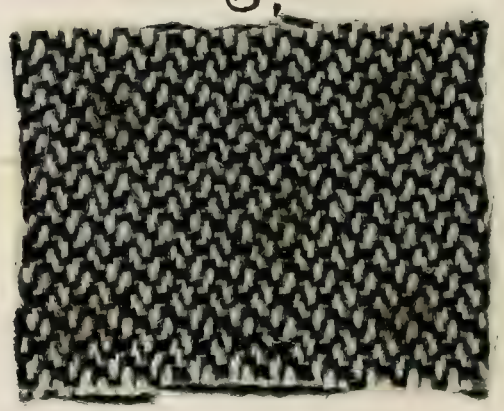
3.



4.



5.



that in patt. 6 the silk in the wp. is purple, whilst that in patt 5. is brown.

Patt II. This pattern has a ribbed ground + small spot warp-float figure. Piece-dyed. Warp = Boty + Mohair. Weft - all Boty. (see Pattern analysis Portfolio for further partics.)

Sheet "D" - All-wool fabs. (cont.)

Patt. I. This is a fine, fairly heavy Botany cloth, with a good handle. Warp = 2/fold Boty. Weft single Boty. yarn. Suitable for piece-dying.

Patt II. This is an embroidered style. Warp = 2/fold Boty + Weft = Single yarn of same stuff. The embroidery thd. is of a very lustrous wool. The embroidery is put on after the gnd. cloth has been woven.

Patt III. This is a double cloth, further thickened + weighted by a thick wadding pick floating between the 2 cloths. Warp = 2/fold Boty yarn, + weft (including wad. pick) = single yarn - Boty. Piece-dyed - navy blue.

Patt. IV. This is known as an Amazon Dress fab, + is composed of 2/80's Boty wp. + a good qual. woollen (no cotton) yarn - about 40 skns. woll. count. Weave = 5 end sateen (warp). As the weft is only to be seen on the back of cloth, cheap matrl. can be used for it— e.g. a woollen yarn; this also give a good full handle - what is wanted. Set - about 100 thds per 1" - giving the 5 end sateen, an upright twill appearance.

Patt. V. This is an all wool cloth of lustrous character - warp + weft being both 2/fold. Colour got by using solid coloured yrns.

Addendum to Rib Structure Patt's.

Patt. V. This is a piece-dyed (Green) cotton (mercerized) cloth.
Wp = 2/fold. m. Cot. Wf. = 3/fold m. Cot.

All-Wool Patterns.

Pattern I. This pattern is a Cross-bred cloth, composed of 2/fold XBred warp, + 2/fold XBred weft. The weave is a crêpe. The cloth has been piece dyed, green.

Patt. II Is the same as patt I, but dyed dark blue.

Patt. III As no I, but dyed dark green.

Patt. IV This is a cross-bred wool fabric, 2/fold wp. + weft, which has a good lustre. The yarns are solid in colour, grey for the Thds. + blue for the picks. Crêpe Weave.

Patt. V. This is a pattern composed of XBred or Eng. wool yarns, both warp + weft being 2/fold. + fairly lustrous. Crêpe weave. White warp. Green (solid) weft.

Sheet "F" (opposite) Union Cloths. (Cotton + wool)

Pattern I. This is a low tweed cloth, having a warp as follows:— Union Thds. consisting of a low (containg cotton) Woollen yarn twisted with a fine 2/fold cotton thd. for strength. (These facts were found by the burning test, based on the facts that cotton burns easily + leaves a white ash, whilst wool burns readily, not so readily, + gives off a distinctive odour.) The colour is got by using solid yarns. A union weft is also employed.

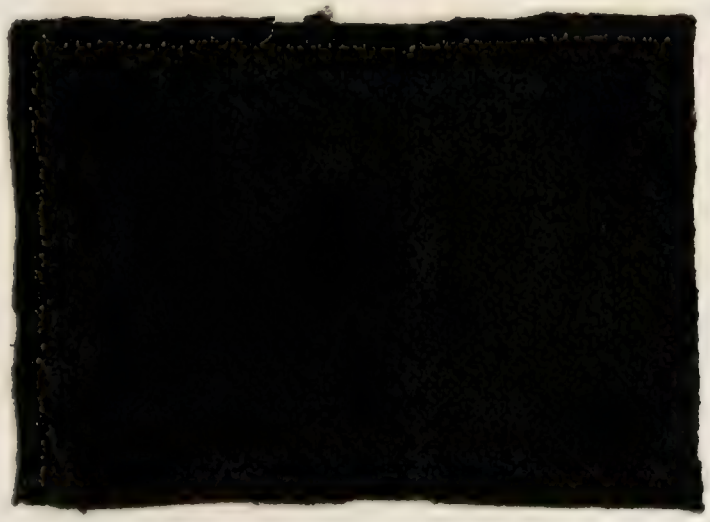
Patt. II. This cloth has been piece dyed black + rather heavily milled. It is known as a "melton", + is composed of low quality Woollen yarns — made of Cotton + Wool.

Patt. III. Cheap Mixture Cloth. This fabric is white in the loom. The ground thds. + pks. are made of Cotton + Wool scribbled together (25% wool + 75% Cott.) whilst the thds. + pks. used in the stripes are composed of 75% wool + 25% Cott. The cloth is then given the usual black dye used for wool fabs.

Union Cloths.

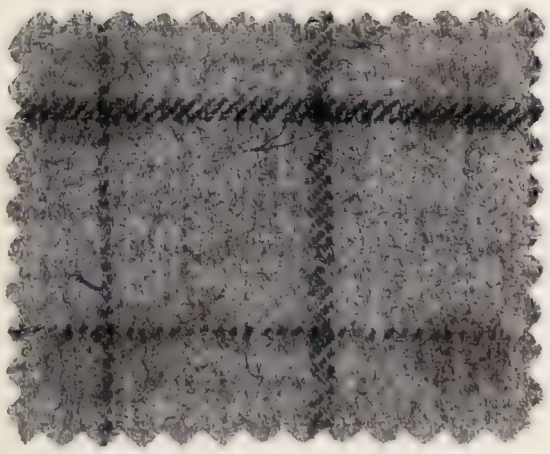
"F."

1.



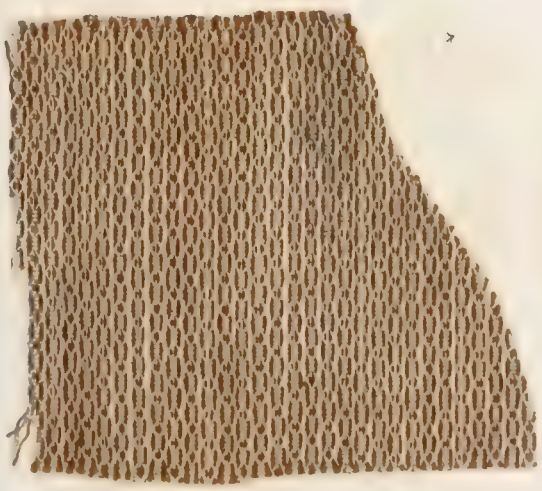
2.

3.



4.

5.



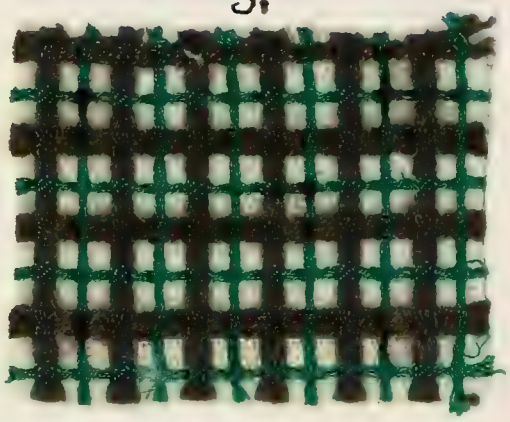
Union Fabrics.

"G".

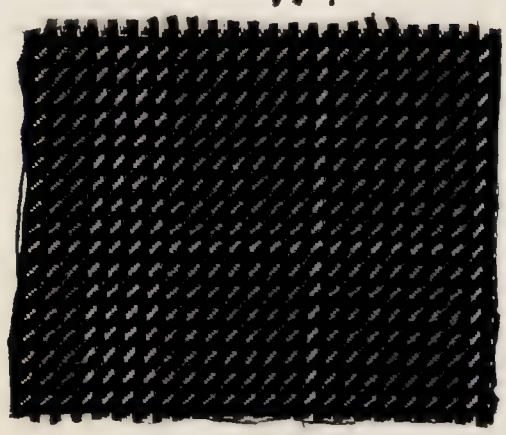
1.

2.

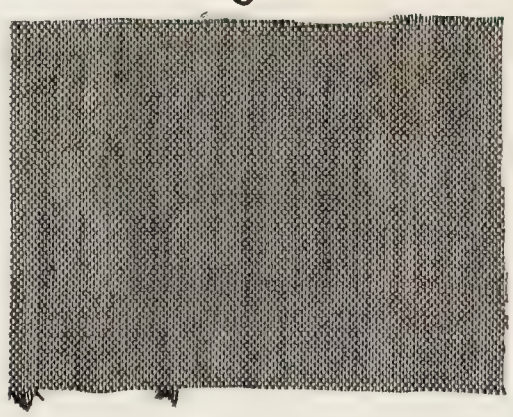
3.



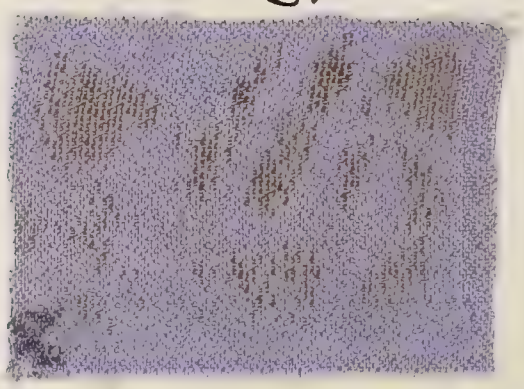
4.



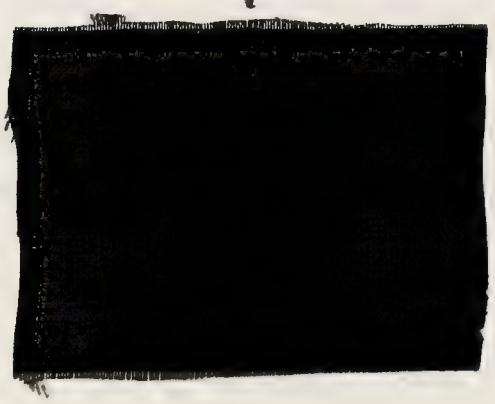
5.



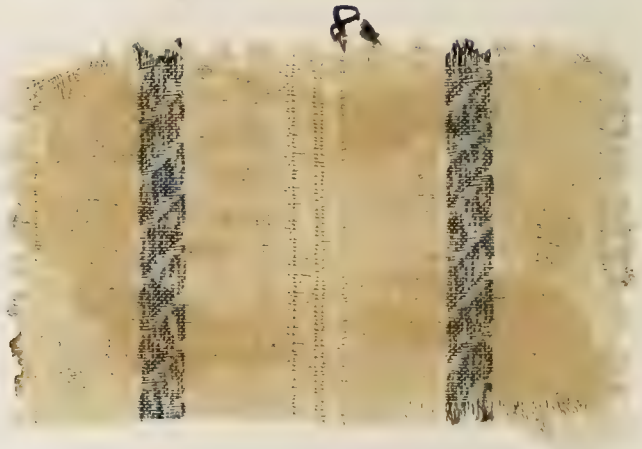
6.



7.



8.



+ the result is a lt. Grey ground + a Dk Grey stripe, — as the cotton is not effected by the wool-dye. Thus we get Cott. + wool being combined to give design.

Patt. IV. This cloth, piece-dyed blue, is made from 2/fold Cotton warps + single Boty weft. Note the very effective Crêpe weave.

Patt V. This gauze style is made from 2/fold cotton warps + single Boty. weft. Colour is got by using solid Coloured yarns.

Union Cloths. Sheet "G."

Patt. I. This pattern is composed of 2/fold Boty warps + single mohair weft, + has been piece-dyed.

Patt. II. This cloth has a wp. of single Boty yarn + 2/fold mohair 1+ is wefted with single Boty yarn.

Patt. III. This fancy Vesting cloth, has, for both wp. + wf., a grey, single, loose spun Wo yarn of Boty, 2/fold green mercerized cotton yarn, + a white 2/fold Boty yarn.

Patt. IV. This patt. has wp. of 2/fold Cotton + single mohair weft. Lustre fabric.

Patt. V This grey linning is made from 2/fold Cott wp + moh. weft.

Patt VI Has a 2/fold Boty wp. + moh. weft. — plain weave.

Patt VII Is same as Patt V, but with black weft.

Patt VIII This contains a cotton wp., part of which is printed, + is wefted with mohair.

Lect. 6 — Varieties of Structures.

Ordinary Structures are those in which warp + weft bend alike during weaving.

Examp. of ord. structure.

Warp { 2/16's wh. Boty Wp. 24 Ends per 1" } | { 2/16's Bk. Boty. Wf. 24 pks per 1" } Weft.

Plain Weave.

Under these conditions result is a fabric with an equal quantity of black + white on surface, indicating that warp + wf. bend alike. Ordinary fabrics must be set in the loom according to the required resultant handle + appearance.

Ex I.

Warp.	Weft
2/36's Boty.	1/18's Boty.
51/52 Ends per 1"	as warp.
4/5" loom width	
56" Fin.	3840 ends in Wp.

Ex II.

Warp	Weft.
2/36's Boty.	1/18's Boty.
60 Ends per 1".	60 pks per 1"
64" loom width	3840 ends.
56" – Fin.	

N° 1 cloth is fuller + softer to handle + slightly heavier.
N° 2 is more boardy — as is set up to limit nearly.

Rib Structures.

There are certain wp. + wf.-rib weaves, which, when applied to square cloths, result in ribbed structures.

Example

3/3 Warp-rib

WEFT. { ——— ——— ——— } loom width 58" / Grey " 57" / Fin. " 56"

WARP. { ——— ——— ——— } 40 ends Wp. / 62 " grey. / 60 " fin.

Therefore, from this diagram, we conclude that warp

Sect 6 — Varieties of Structure.

Ordinary Structures are those in which warp + weft bend alike in weaving.

Example of ord. structure

Warp { 2/10 [illegible] Warp. / 32s 8ks per 1" }

{ 2/16's Bk. Boty. Wf. / 24 pks per 1". } Weft.

Plain Weave.

Under these conditions result is a fabric with an equal quantity of black + white on surface, indicating that warp + wf. bend alike. Ordinary fabrics must be set in the loom according to the required resultant handle + appearance.

Ex I.

Warp.
2/36's Boty.
57/52 Hks per 1"
45" loom width
56" - 7in.

Weft
18's Boty
as warp
2520 ends in wp

Ex II

Warp
2/30's Boty.
60 Hks per 1"
64" loom width
56" - 7in

Weft
2/18's Boty.
60 pks per 1"
3840 ends

No 1 cloth is fuller + softer to handle + slightly heavier.
No 2 is more boardy — as is set up to limit nearly.

Rib Structures

There are certain wp. + wf.-rib weaves, which, when applied to square cloths, result in ribbed structures.

Example

2/3 Warp-rib

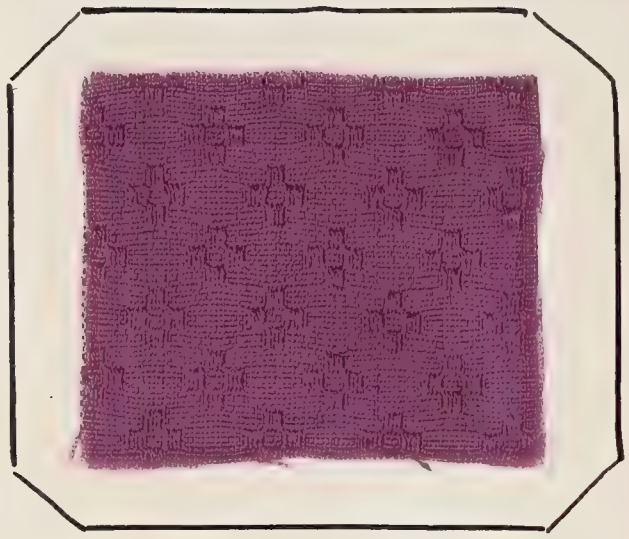
Weft { loom width 58"
Grey " 57"
Fin. " 56" }

Warp { 70 yds Wp.
62 " Grey.
60 " Fin. }

Therefore, from this diagram, we conclude that warp

ARMURE

FABRIC.



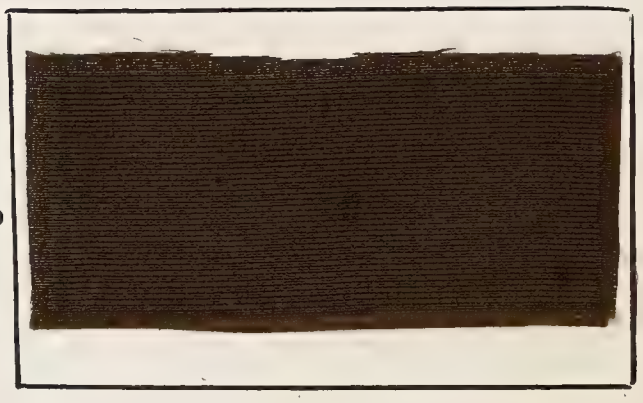
GROUND-WEAVE

= 2/1 WARD

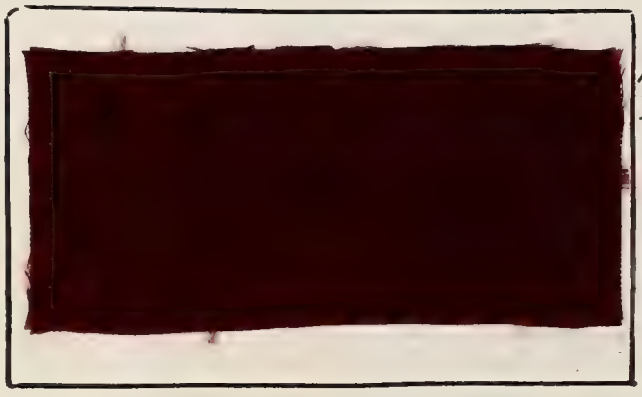
RIB.

RIB STRUCTURES.

3/3 WARP RIB.

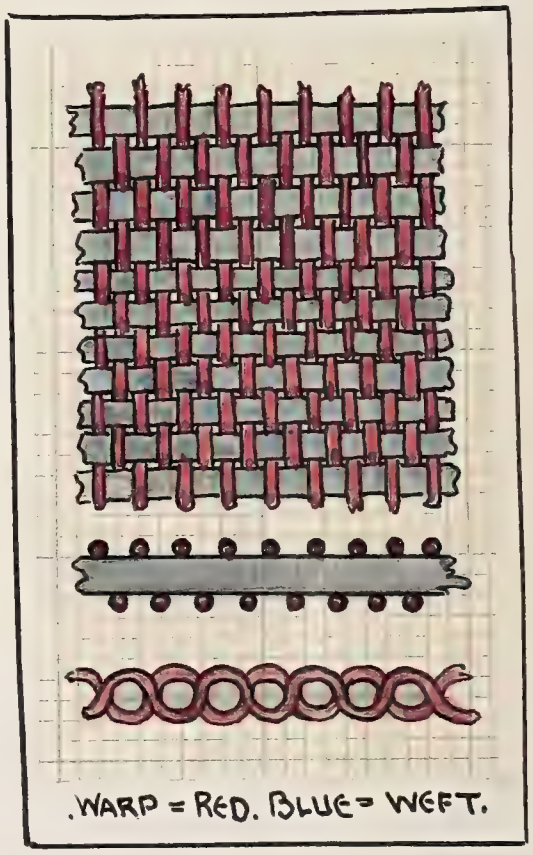


SILK.



3/3 WARP RIB.

ORDINARY STRUCTURE CONVERTED TO RIBBED STRUCTURE



WARP = RED. BLUE = WEFT.

"POPLIN"

See opposite page for particulars

Sect 6 (Cont.) **Rib Structures (Cont.)**

bends excessively, in wp-rubbed structures. In 3/3 weft-rib just the opposite conditions prevail, i.e. wp. remains straight + wft. only bends.

Converting Ordinary Structures into Rubbed Structures.

An ordinary structure can be converted into a rib structure

e.g.:-

	Warp		Weft	
Wp Poplin Dress fabric	2/60's Botty 135 Ends per 1"	Plain Weave.	1/12's Botty. 47 picks per 1".	Warp Rib

∴ the weft is thick + stiff, only wp. bends, + as there are great no. of Ends. per 1", the weft is hidden.

Warp + Weft Back Styles.

Any ordinary single-cloth may be backed with extra warps or wefts, to increase the weight or improve the handle or both, of the single cloth.

Double Cloth Styles.

Where 2 cloths are woven together + firmly bound. Advantages:— (1) Height of single cloth may be doubled, (2) face cloth may be one weave + order of colouring + the back cloth a diff. weave.

Lecture 7. Varieties of Structure (Cont) Nov 20.

Warp Backed Type. The following list gives a good idea of the structure of a high quality Wo (Botty.) Warp-backed cloth :-

Warp { 2/36's Wo Botty. { 1 End. face. / 1 end. back. } 112 Ends. per 1" }

Weft { 1/18's Botty. (Wo) 56 picks per 1" }

Weft Backed.

If, however, the same cloth was wanted, but having, this time, a weft back, then the particulars would be :-

Warp { 2/36's Wo Botty 56 Ends per 1" }

Weft { 1 pick face / 1 pick back } 1/18's Botty. Wo. 112 picks. per 1".

Lecture 7 (cont.) Varieties of Structures (Cont.)

Imitation Warp & Weft Backed Styles. These structures have the appearance of being backed with warp or weft, but are actually single cloths, as only 1 warp & weft is employed. The backed appearance is developed by re-arranging the thds. & pks. of any single weave in a somewhat ingenious manner.

Extra Material. This is often used to further ornament a fabric. For instance, extra warp or weft is employed to ornament the face of single cloth textures.

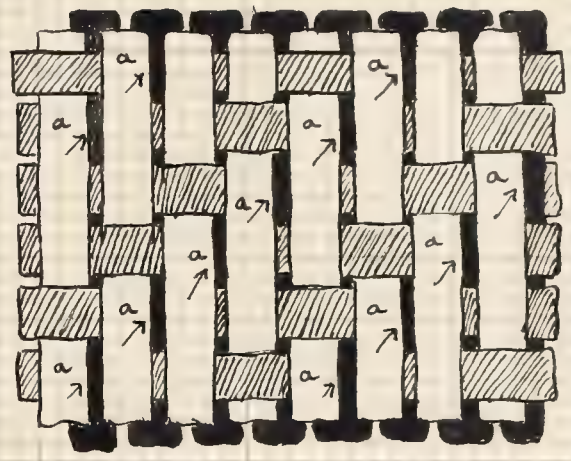
Swivel Spots. An economic method of introducing extra weft spots, is by means of swivel-weaving. In ordinary extra-weft figured fabrics, the figuring material (generally silk or other expensive yarn) is chiefly on the back of the fabric & only comes up at more or less long intervals to form the figure or spot. In swivel weaving there is no such waste of material, as each spot is produced by means of a "swivel". The latter consists of a small shuttle box, a little shuttle & a tiny spool or bobbin. In this method it is necessary to weave the cloth wrong side up, so that the end of the thd. making the spot finishes on the back of the cloth, & can be conveniently cut if necessary.

Lappet Styles. Lappet-weaving is a method of obtaining figuring on fabrics, & is much resorted to to produce low quality cotton cloths having a figure on. During weaving, the lappet thd. moves to the right or to the left, interlacing only with picks, at the extreme edges of the figure or spot. In most cases the figure is continuous (i.e. goes the whole length of the cloth), & is generally of a zig-zag character, which is interrupted at intervals by the occurrence of the large (comparatively) spot. See patterns. The cloth is also, here, woven upside down.

Gauze Styles. In Gauze weaving, certain thds. are made to cross & interlace at each side of others. A striking feature is that where a crossing takes place between any 2 pks. there will be a space in the cloth according to the diameter of the crossing thd. On this account, the most open type of (~~cloth~~) texture is produced by gauze weaving.

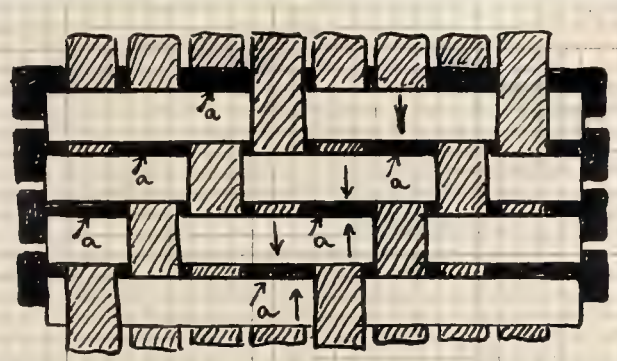
Backed Cloths. (1.)

Warp = Backed Style.



White Yarn = Face Warp.
Black Yn. = Back Wp.
Grey Yn. = Weft.

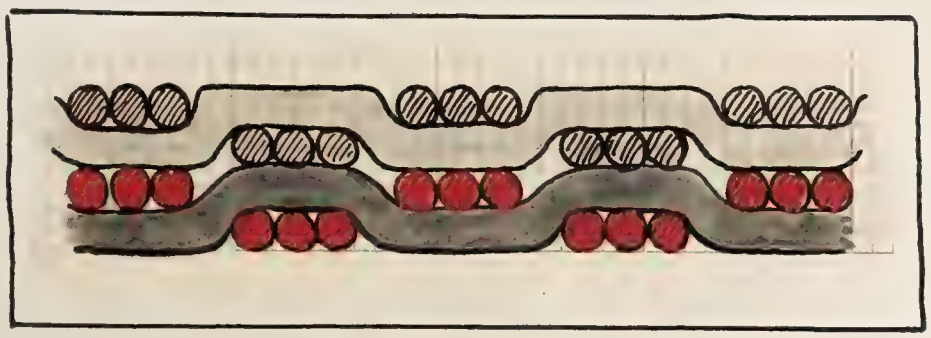
Weft = Backed Style.



White Yarn = Face Weft.
Black Yn. = Back Wf.
Grey Yn. = Warp.

"a" shows the Back yarn brought on to Face to bind, yet hardly showing.

(2.) Double Cloths.

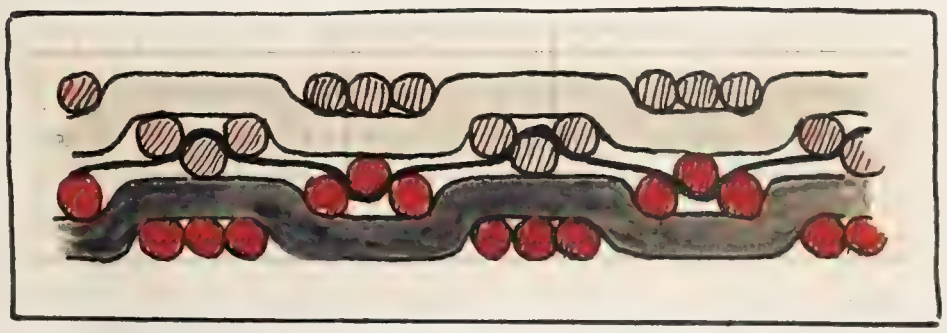


Warp or Weft Section.

Unbound Double Cloth.

3/3 Twill Face & Back.

Dark Colours = Back.



Warp Section.

Same as above but with

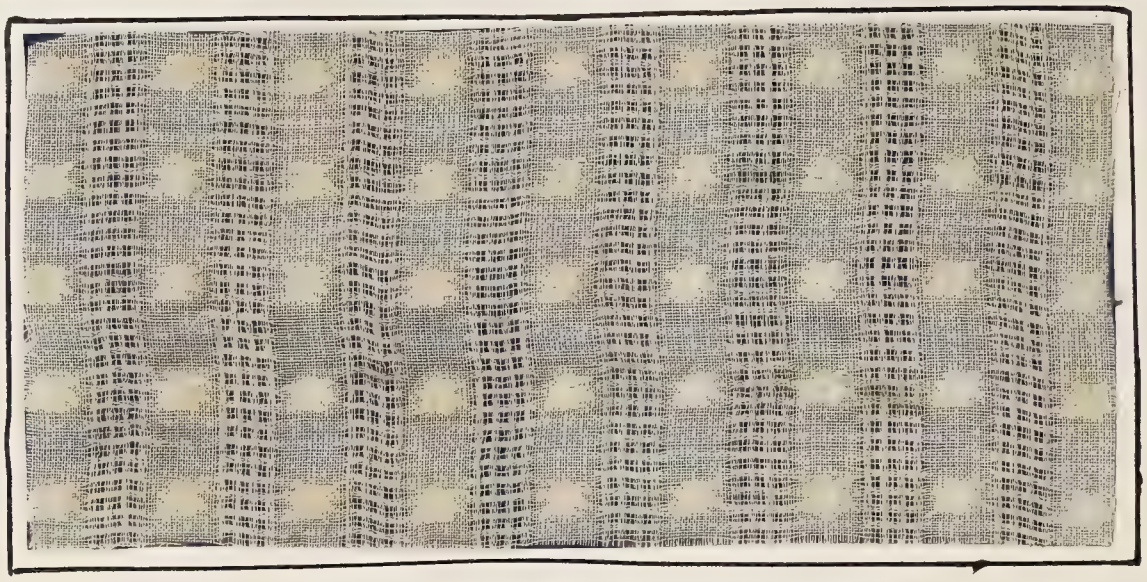
Binding Thread.

(Cotton generally.)

(See Lecture 7 – Additional Note.)

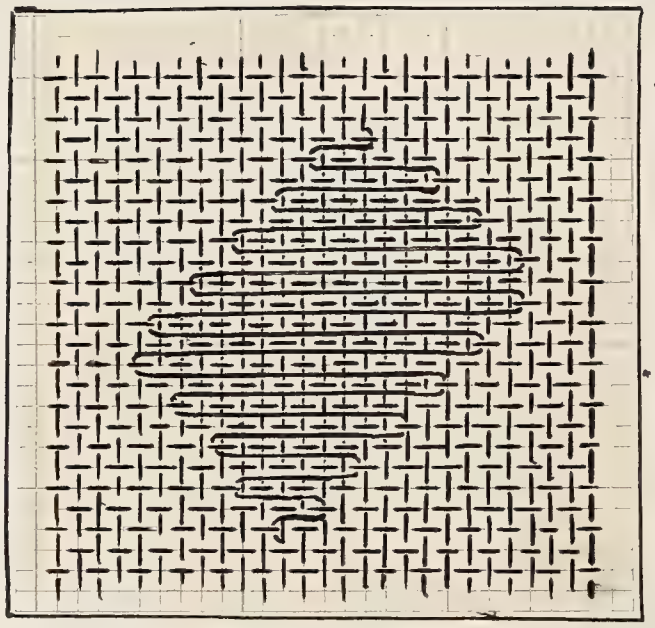
Sect. No 7.

Pattern "A"



"Curtaining"

Swivel Spot Styles.



"B".

"A" = Pattern of fabric with Swivel-Spots.

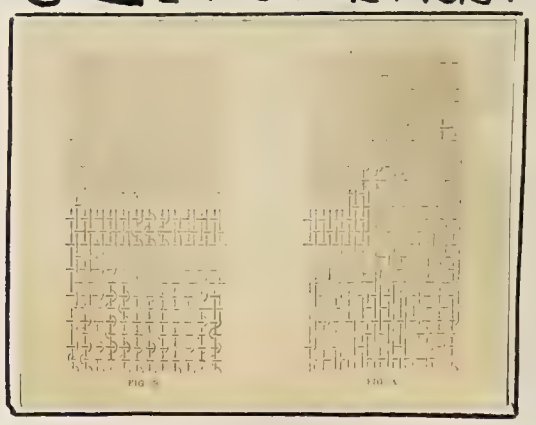
"B" = Diagram showing spot effect on plain ground. Note interlacing only at edge of figure.

Pattern with Gauze Ground.

"Madras" Muslin.

Gauze.

Diagram of Gauze Interlacings.



Lecture 7 (Cont.) Varieties of Structures (Cont.)

Pile Fabrics. This style of cloth is made by an extra wp. rd. or pk. of weft being made to loop on the surface of a plain woven texture. There are 3 types of Pile cloth :- 1. Loop-pile fabrics
2. Cut-pile fabrics
3. A combination of the two types above.

Note the patterns + diagrams for further information.

Double Cloths. (Additional remarks) When weaving certain styles of double-cloths, a special binding warp is often employed to ensure the adhesion + contact of the 2 separate cloths. For binding 2 cloths together which are of different design + colouring, + composed of thick yarn (which has to be low set in loom) an extra, fine cotton warp is essential, to bind the 2 cloths together in a satisfactory manner.

Lecture 8. The Designing of Weave Stripes + Checks. Nov 27.

On a mounting-sheet will be found several examples of weave stripes, 5 in all, complete with design, draft + pegging-plan.
Example 1. This weave stripe design is based on the 2/1 twill. (both warp + weft weave.) The design repeats on 24 hds. + 3 picks, but requires 6 shafts to weave, + is suitable for producing cheviot cloths, of, say, the following particulars :-

Warp.
2/20's Cross-bred
10's reed 3's
2,100 ends in warp.

Weft.
2/20's X Bred.
30 pks. per 1"
70" = loom-width
56" = finished ".

The cloth, of course, will be given a cheviot finish, i.e. it will be heavily shrunk, + then given a "face" by milling + raising, so that all "thread" appearance vanishes. This finish is common to all "Cheviot" cloths.

Lecture 8 (cont.) Weave Stripes (Continued).

Examp. II. This effective stripe design is all derived from 2/2 Twill, & for this reason, can be woven with 4 shafts, if a suitable draft (see one given) be employed. If 2 colours are used in the warp, the effect is very striking. If the design be applied to the following make of cloth, a saleable fabric will result.

Warp.

2/36's Coloured Botany yarns.

Warp Plan. { 8 Thds dark lavender
8 Thds dark slate

15's reed 4's

3960 ends in Wp.

Weft.

2/36's Black Boty.

56 pks. per 1".

66" in loom.

56" Fin. width.

1 Thds. per yd finished.

To be given a clear finish, & slightly milled.

Examp. III.

This is a rather bold & large stripe pattern, made from 3/3 Twill really (it can thus be woven on 6 shafts — with proper draft). The design could be applied to the cloth given below & should show up very well.

Warp.

2/30's Coloured Boty, (slate or lavender)

16's reed 4's.

4224 ends in Wp.

16¼ oz per yd. (finished.)

Weft.

2/30's Black Bot.

60 pks. per 1"

66" in loom. } width.

56" finished. }

To be finished clear & milled slightly.

Examp. IV. This weave is of the "crammed-stripe" variety, & would give a very effective cloth, if woven on a loom fitted up with the following materials, & 10 shafts & drafted & sleyed as shown by the design.

Warping & Reeding Plan. { 8 Thds. silk twist in 2 dents.
40 Thds 2/30's Boty in 20 dents.
19 dents per 1" of reed.

1/15 Coloured boty. = WEFT.

45 pks. per 1".

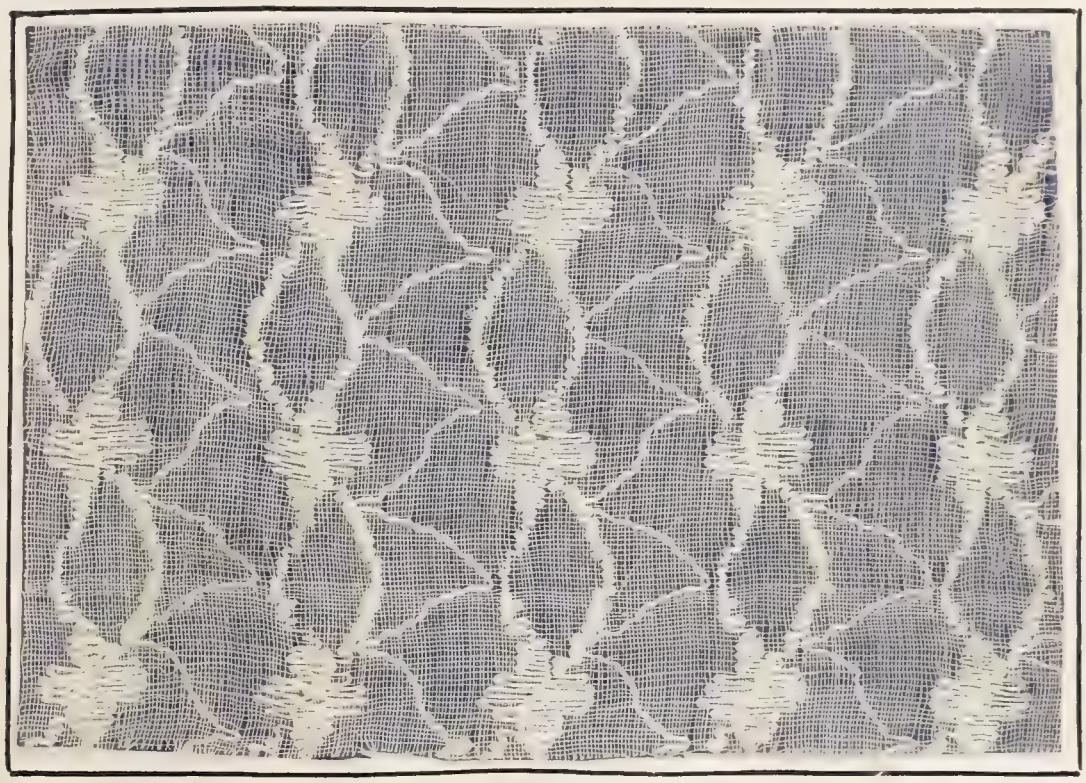
66" = loom width.

56" = fin. width.

P.T.O.

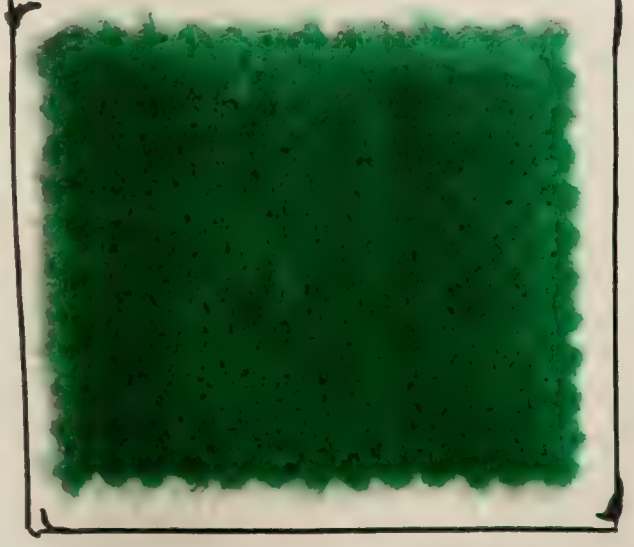
Gesture 7.

Lappet Styles.



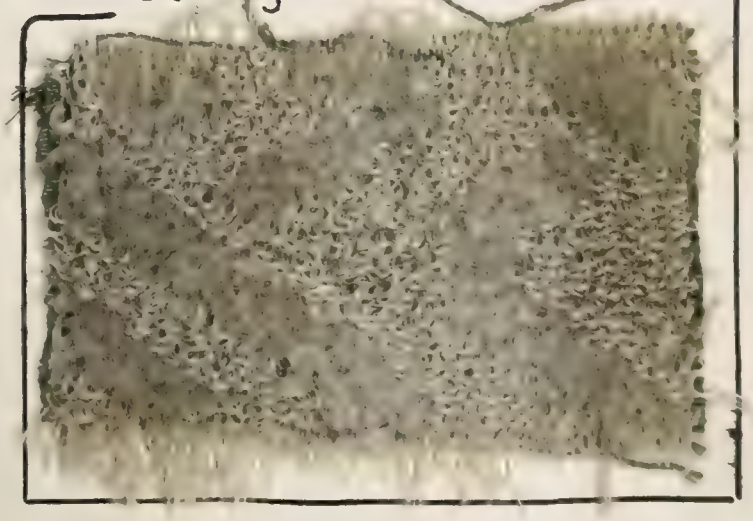
Pile Fabrics.

CUT-PILE.

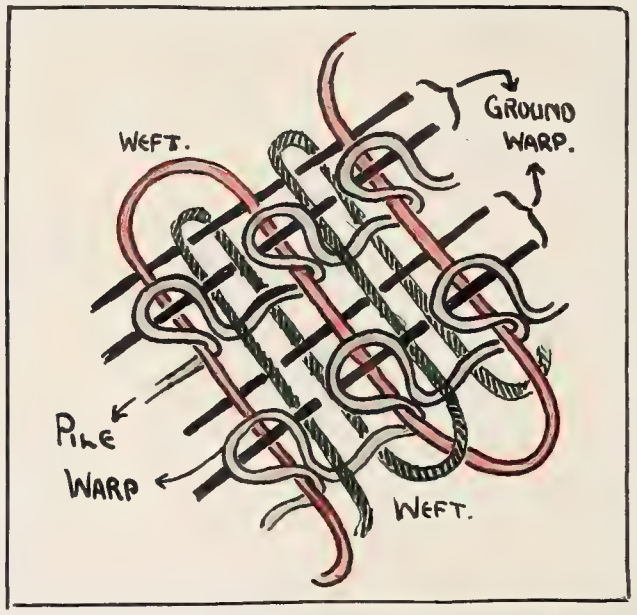


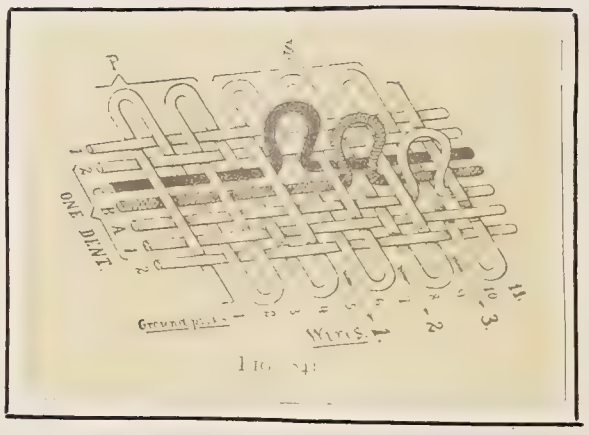
Imperfection = DK. LINES WARP-WAYS.

CUT & LOOP PILE.

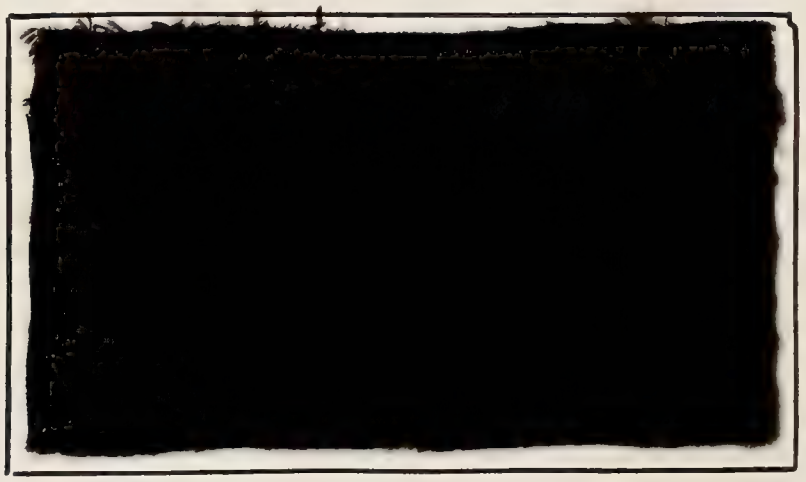


Pile Cloths.



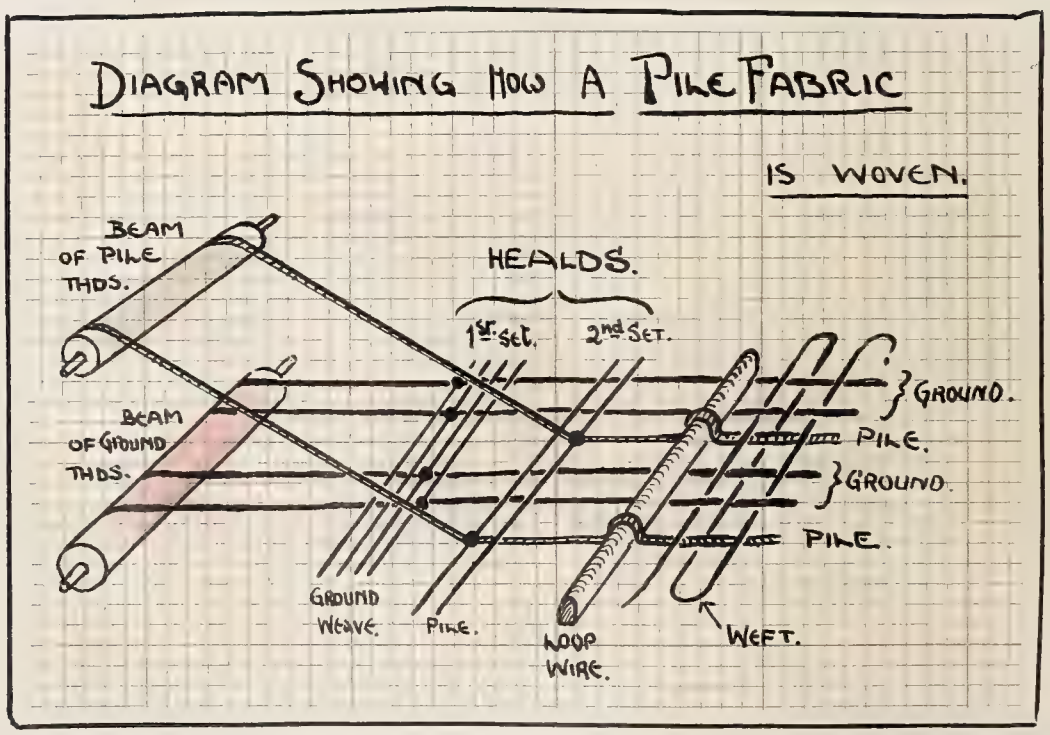


Silk Pile



Plush Fabric.

Diagram Showing How a Pile Fabric is Woven.



LECTURE 8. (Cont.) Stripes + Checks (Cont)

Example IV (Cont) From the particulars given overleaf, it was found that there would be 57 repeats of pattern across the piece (66" wide × 19 ends = 1254 ends across piece, which divided by 22 ends (1 pattern) = 57 patts.)

57 × 8 thds silk = 456 silk thds. in piece.
57 × 40 " Boty = 2280 Boty. " " " .
Total: 2736 thds. in warp.

Example V. This stripe weave is a sort of warp-faced or "Amazon" style + would be very effective with these materials:—

Warp.
2/60's Boty.
14's reed 8's

Weft.
1/40's Boty.
90 pks per 1".

LECTURE 9. Loom Capabilities. '12 Dec 4.

The Possibilities of the Tappet Loom. The limit of tappet-looms may be taken at a (weave) plan which occupies 8 thds. + 8 picks + has regular interlacings. For example tappets to tread the 8-end diagonal may readily be obtained, as can those for other standard (simple) weaves; but in the case of an 8-end plan which is irregular in its interlacings (as an 8-end crêpe for example), inconvenience would be experienced in obtaining the tappets.

The Dobby Loom.
This is capable of working up to 28 heald shafts, the mechanism of the dobby being such that it is more convenient to actuate a larger no. of shafts than the tappet loom. Dobby-weaving is more expensive than tappet weaving, the output per hour (say) being much less.

P.T.O.

LECT. 9 (cont.) **The Colouring of Stripes + Checks.**

Design + Character is given to a cloth by introducing coloured thds. in the direction of warp or weft, or both. Colour may be applied to produce stripes or checks, by 3 methods :—

(1.) By introducing coloured thds into a plain (i.e. – ordinary) weave fabric.

(2) By introducing coloured thds. to stripes + checks already developed by weave

(3.) By a combination of weave + colour to form the ground, + a re-arrangement of either or both to form the stripe.

(Printing, using different materials + dyeing for one or both (each different colour) etc. are methods of giving design + colour to a fabric, not dealt with here)

Example I. The first method is illustrated in examples a, b, c, d, e + f, which are to be produced in the width of cloth as a section range; the thin lines represent 2 thds. + the thick lines 4 thds.

For the complete particulars, see the loom card (both sides) on mounting sheet, + also the sketches of the 6 patterns.

Lect. 10. **The Colouring of Stripes + Checks** (cont.) **Dec. 11th '12**

Method II, namely. introducing coloured thds. to stripes + checks already developed by weave is illustrated in Example 2.

Example II. This is a section range of Tennis cloths. (Note. A Tennis cloth is a cloth usually of lightish texture + colour, soft handling, + usually made from wool.) They are soap scoured — not dyed.

Warp.

2/50's @ grey Boty. (ground)

Twist for stripes (40/2 fold Blue Spun Silk + 2/50's Grey Bot.)

64 thds per 1".

Weft.

1/24's grey Boty.

60 pks per 1".

See mounting-sheet for sketches of 6 patterns as above, complete with draft for each.

Further particulars on next page.

P.T.O.

Weave Stripes

WEAVE.

DRAFT.

P.P.

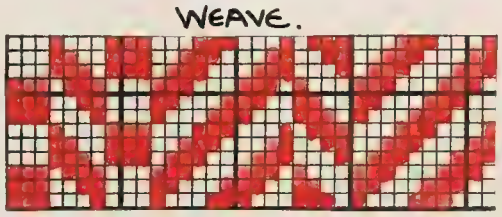
WEAVE.

LAVENDER. SLATE.

DRAFT.

PEG. PLAN.

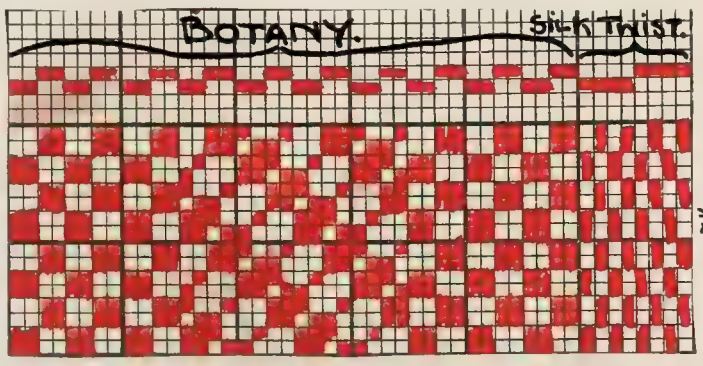
WEAVE.



DRAFT.

P.P.

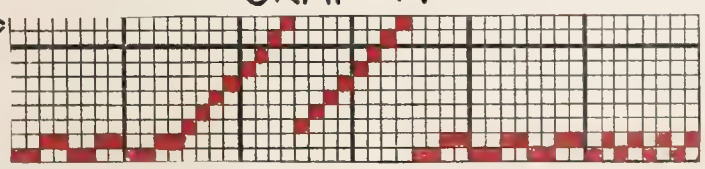
WEAVE & SLEY-PLAN.



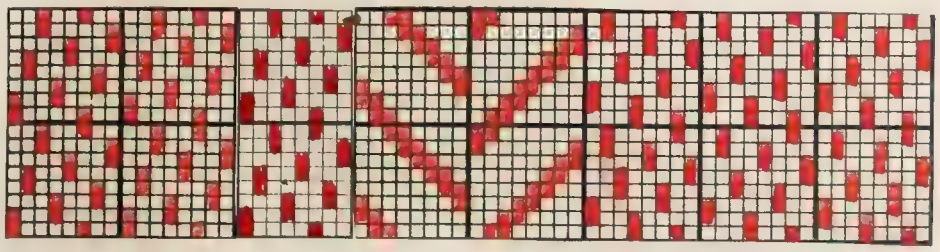
PEGGING

PLAN.

DRAFT.



WARP-FACED WEAVE.



DRAFT.

PEGGING

PLAN.

LOOM TICKET.

A7843. 1000.

T. V. STAUB.

City of Bradford Technical College.

DEPARTMENT OF TEXTILE INDUSTRIES.

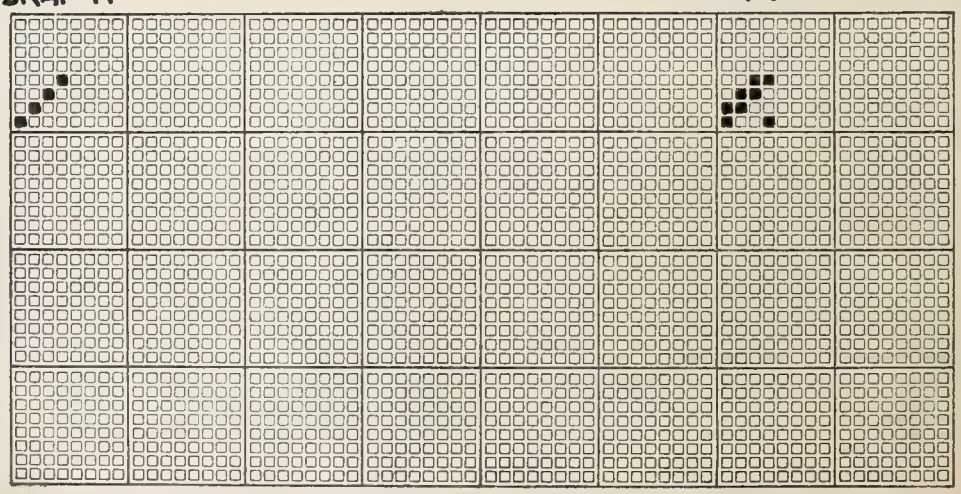
Date on Loom .....

(TAPPET.) POWER *Loom No.* ? *Date off Loom* .....

WARP.	WEFT.
Counts & Quality 2/48's	Counts & Quality 1/24's
Coloured Boty.	DARK MIXTURE
& DK. MIXTURE Boty.	BOTANY.
14 's Reed 14 's.	Picks per inch 60
SCHEME.	
WEAVE UP WARP.	
Bradford Set. 57·6's.	

DRAFT.

PEGGING PLAN. (2/2 TWILL)



SEE LECTURE No. 9.

PARTICULARS OF EXAMPLE No. 1.

FRONT.

Lect. 10 (Cont.) Colouring of Stripes + Checks. (Cont.)

The Patterns are to be woven on one tappet-loom as a "6-section-range". Each section of warp is drafted as shown, + with a set of 16 2/2 twill tappets, will give patterns as shown in the sketches. Warp = 5 yds.

Section I.

2 Thds twist
30 " Grey Botny.

22 repeats.
44 Thds of twist
660 " Botny.
704 ends per Section.

Section II.

4 Thds. Twist
60 " Grey Botny.

11 repeats
44 Thds twist.
660 " Bot.
704 = Total

Section III.

2 Thds twist.
30 " Bot.

22 repts.
44 Thds twist.
660 " Botny.
704 Total.

Section 4.

2 Thds. Twist } 63
5 " Bot. } = in
2 " Twist. } repeat.
54 " Bot. } one missed to make draft fit on.

11 repts.
plus 11 Thds over. (Bot.)
44 Thds. Twist.
660 " Bot
704 = Total.

Section V.

4 Thds twist
19 " Bot
2 " Twist
19 " Bot
4 " Twist
16 " Bot.

11 repts.
110 Thds twist.
594 " Bot.
704 = Total.

Section VI.

2 Thds Twist.
46 " Botny.
2 " Twist
14 " Botny.

11 repts.
44 Thds. Twist
660 " Bot.
704 = Total.

Total no. of ends = 704 × 6 = 4224 ends.
Loom width = (4224 + 64 for lists) ÷ 64 per 1" = 67".

32 white Botny. thds. at each edge for lists.

16's reed 4's. One Beam. 4 shafts only necessary.

Lecture 11. Stripes + Checks (Cont) Dec. 18th.

3rd Method of Producing Stripes + Checks, namely that of a combination of weave + colour to form the ground + a re-arrangement of either or both to form the stripe

Example 3, shows a very effective check pattern made to these particulars:-

Warp { 2/48's Botany; 1 Thd. Lt. Grey; 1 Thd. Dk. Grey } 64 Thds. per 1".

Weft { 1/24's Botny; 1 Thd. Dk. Grey; 1 Thd. Lt. Grey. } 64 pks. per 1"

Stripes + Checks (Cont.)

Examp. 4 results in a very striking small check pattern when applied to warping + wefting as in Examp. 3.

Examp. 5. For wp. + wf. the same material is used as in Examp. 3, but the following order of warping + wefting is applied to 2/2 twill, + produces the large check shown on a mounting sheet :—

	2	4 Rds	Brown (light shade to give contrast)
		4 "	Black
These nos. indicate times repeated.	8	1 "	Brn. (" " " ")
		1 "	Blk.
	2	4 "	Brn. (" " " ")
		4 "	Blk.
	4	2 "	Brn. (" " " ")
		2 "	Blk

Examp. 6 is a very effective stripe pattern composed of 2 weaves + applied to one order of colouring.

Warp. 43 skeins Woollen, 70 Rds per 1"
ORDER = 3 dark, 3 light.

Weft. 43 skns. Woll., 68 pks. per 1".
ORDER = 3 dark, 3 light.

Examp. 7. **Warp** 37 skns. Woll, 30 Rds per 1".

Weft. 35 skns. Woollen, 30 pks per 1"

Order of Wping :- 4 Rds Silk Twist (Blue)
6 repeats. { 2 " Dk. Mixture (Black); 2 " Lt. " (Grey); 2 " Twist yarn (Brown)

Picking :- 2 pks Dk. (Blk); 2 " Lt. (Grey); 2 " Twist. (Brown)

Loom Ticket.

Date made out Dec 4th 1912. Warp No.

Power Loom No. ? (Tappet) Piece No.

Style of Fabric Section - Range. Weight per yard

WARPING AND DRESSING PARTICULARS.

Counts and Quality 2/48's Coloured Boty. (Shade No. ?)

and 2/48's Dk. Mixture Boty. (Shade No. ?)

No. of Ends in Warp 4288 (Counting Lists) giving 6H ends per inch.

No. of Shafts 4 Lists 32 Dk. Thds. at each edge. Not to be Sized

No. of inches wide. Loom 67" over all Grey Finished 56"

No. of yards long. Loom 5 yds. Grey Finished

No. of Sections 6. Ends per Section 704. Beams 1.

DYEING AND FINISHING PARTICULARS.

Clear Finish.

Weight of Piece. Grey Finished

SCHEME.

Section No. I.	Sectn. II	Sectn. III.	Section IV.
2 Ends Coloured Boty. 6 " Dark Mixture ". 704÷8 = 88 Repeats. 176 Coloured B. ends 528 Dark B. " 704 ends in Section	2 Ends. Colour. 12 " Dark. 704÷16 = 44 Rep'ts. 88 Colour } ends 616 Dk. 704 ends in Section	2 Ends Colour 30 " Dk. 22 Rep'ts. 44 Colour 660 Dk. 704 = Total.	2 Colour 14 Dk. 2 Colour 46 Dk. 11 Rep'ts. 44 Colour 660 Dk. 704 Total in Section

Section V.	Section VI.	Total No. ends in Wp.
4 Colour 20 Dk. 2 Colour (8) 8 Dk. 2 Colour 30 Dk. 11 Rep'ts. 88 Colour 616 Dk. 704 ends in Section	2 { 4 Colour. 4 Dk. 4 Colour 44 Dk. 11 Repts. 132 Colour 572 Dk. 704 ens in Section	572 ends Coloured Boty. 3652 " Dark Mixture ". 64 " Dk. Boty. for Lists, (32 at each edge) 4288 = Total no. ends in warp.

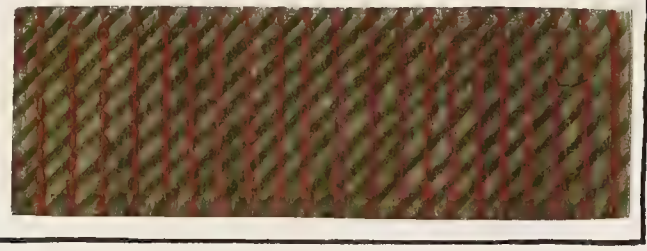
See Lecture No. 9.

Particulars of Example No. 1.

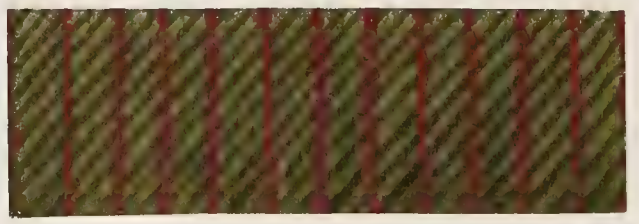
Back.

Example I.

Section I.



Section II.



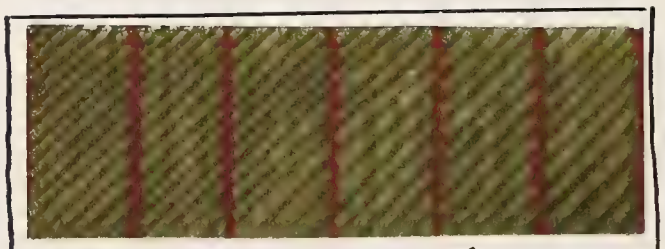
Coeture 9.

Sketches of 6 Patterns (Boty. Cloth) in a

Section-Range

See Loom Ticket on previous page.

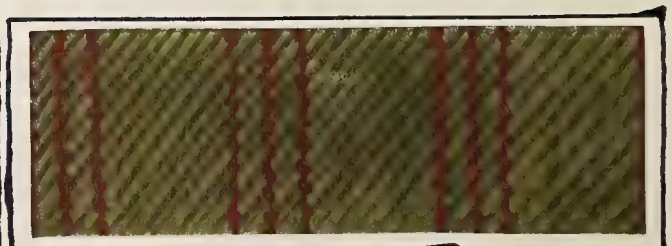
Section III.



Section IV.

Section V.

Section VI.



Lecture No 12. The Colouring of Stripes & Checks (cont.) Jany. 8th.

Method 3. (cont.)

Examples 8, 9, 10, 11 & 12 (to be seen on a following mounting-sheet) result in very striking striped weave & colour effects, if the weaves given are woven with the following orders of colouring of warp & weft.

	Warp.	Weft.
1st Order of Colouring.	1 thd. Grey.	1 thd. Grey.
	2 " " Black.	2 " " Black.
	1 " Grey.	1 " Grey.
2nd Ditto.	3 thds Grey.	
	4 " Black.	
	4 " Grey.	1 thd. Grey.
	4 " Blk.	2 " " Blk.
4 times	2 " Grey.	1 " Grey.
4 times	2 " Blk.	
	1 " Grey.	
3rd. Ditto.	2 thds. Grey.	2 thds. Grey.
	4 " Blk.	4 " Blk.
	2 " Grey.	2 " Grey.

Lecture No 13. Weft-Rib Weaves in Conjunction with other weaves. Jany. 15.

In these structures weft rib weaves or "cords" are introduced intermittently to produce stripes, making what is known as a "piping" effect. Ordinary, & weft-rib weaves take up the warp during weaving differently; consequently 2 warp beams must be used, one for the weft-rib threads, & one for the ordinary weave thds. However, if it is desirable to employ one warp beam only, the weft-ribbed weave can be so modified that the warp thds will bend as much as in an ordinary structure.

P.T.O.

Lect. 13 (Cont.) Weft-rib weaves in conjunction with other weaves (Cont.)

Example I. "Ia", "Ib" + "Ic" are imperfect cords. To weave a length of cloth, 2 warp-beams would be essential. Example "Id" shows the modification it is necessary to make in the cord, to create bending of warp "pipe" thds. + thus obviate the employment of 2 beams.

Example II. This is a stripe design composed of 128 thds. of ground weave + a stripe of piping or cord.

Warp { 2/48's Light Grey Mixture Botany. 118 thds per 1" } Weft { 1/24's Black Botty. 80 pks per 1". }

Example III. This cloth could be suitably made to the following particulars:-

Warp { 2/48 grey Botty. 90's set Bradford. (100 thds per 1") } Weft { 1/24's grey Botty. 70 pks per 1". }

Examp. IV. This is a diagonal style composed of Wp. + Wf. ribs.

Lect. 14. "Cords" (Cont.) Jany 22.

Example V. illustrates what is known as a Bedford Cord or Corduroy style. See mounting-sheet for weave.

Warp { 2/60's Botty 22½'s reed H's (90 per 1") } Weft { 1/24's Botty. 70 pks. per 1". }

Examp. VI. Here is shown the introduction of 2 wadding thds per cord, into the warp of the style shown in Ex. V., the idea being to produce a more rounded + defined cord.

Order of Warping for Style VI.

3 thds.	2/60's Botty.		
1 thd.	2/20's Botty.	— for Wadding.	Additional thds.
2 thds.	2/60's Bot.		
1 thd.	2/20's Bot.	— for Wadding.	
8 thds.	2/60's Bot		
1 thd.	2/20's Bot.	— for Wadding.	
2 thds.	2/60's Botty.		
1 thd.	2/20's Bot	— for Wadding.	
5 thds.	2/60's Bot.		

P.T.O.

Example No. II

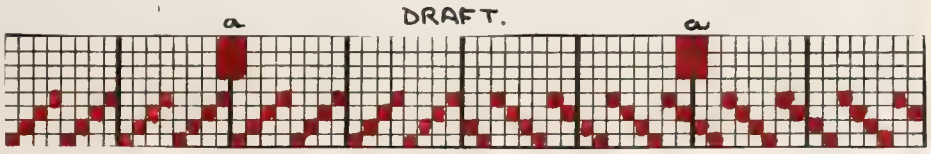
Range of Six Tennis Cloth Styles.

Pegging Plan = 1/1 Twill.

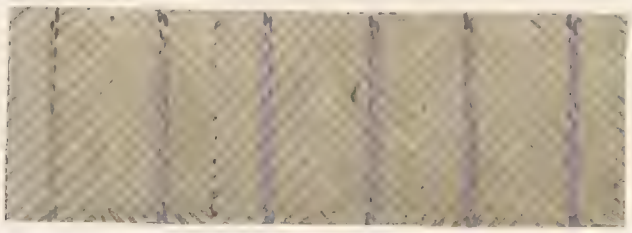
"a", on draft, = position of blue silk twist threads.

Lecture No. X

Section I.

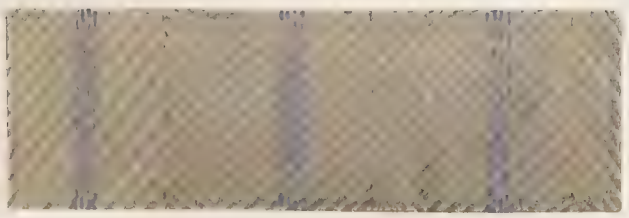


SKETCH.

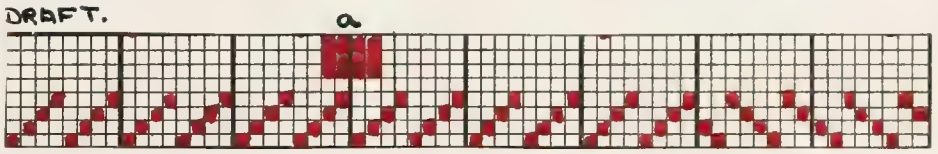


Section II.

SKETCH.

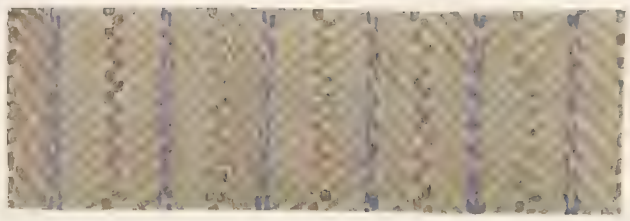


DRAFT.

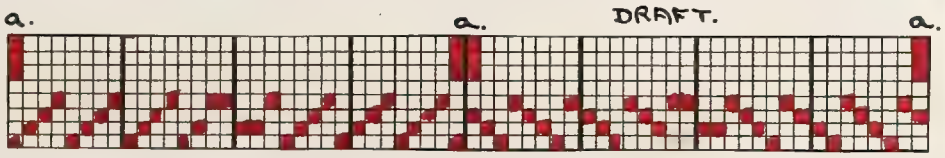


Section III.

SKETCH.

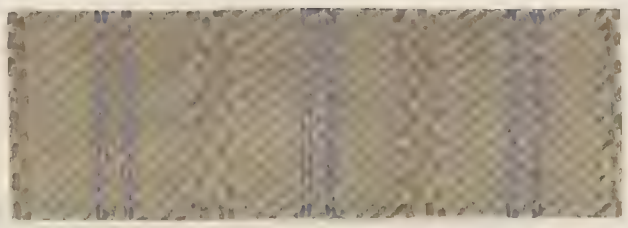


DRAFT.

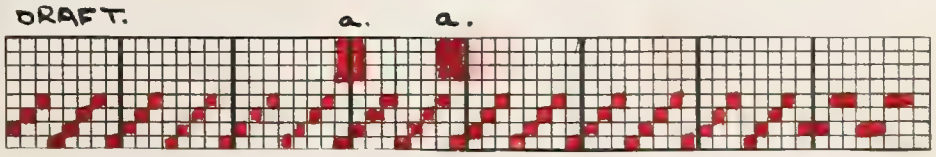


Section IV.

SKETCH.

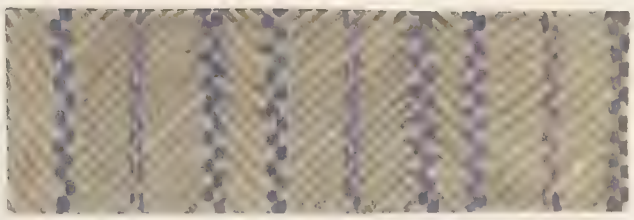


DRAFT.

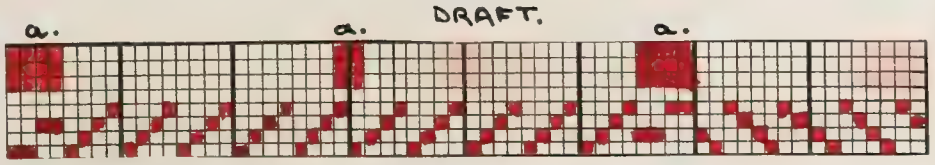


Section V.

SKETCH.

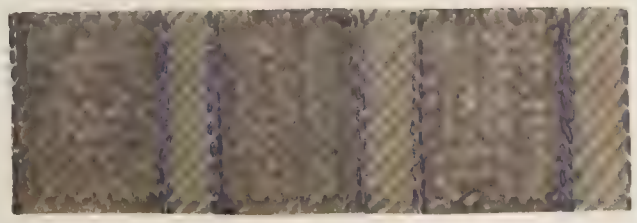


DRAFT.

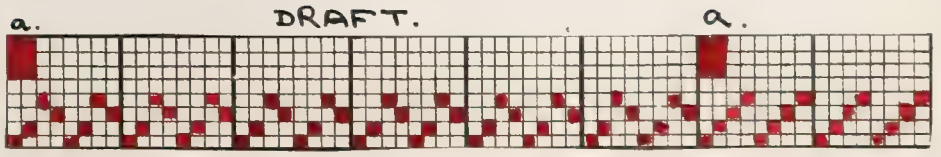


Section VI.

SKETCH.

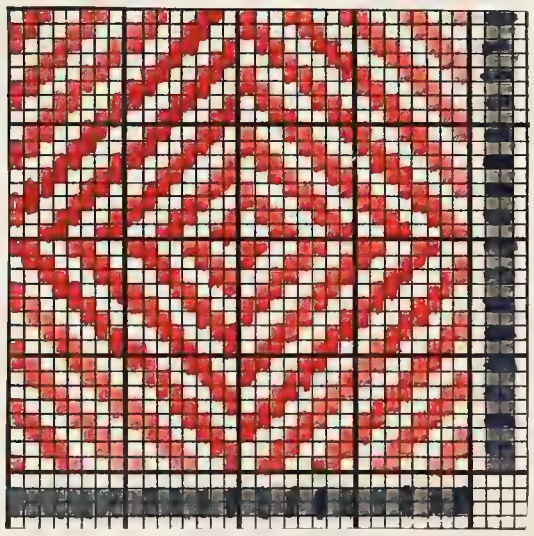


DRAFT.



Stripes and Checks. Lecture 11. Method 3.

Weave & Colour.



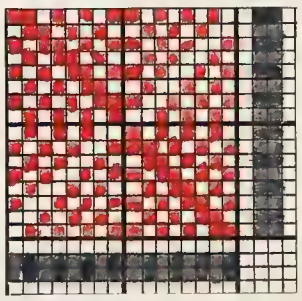
Example No. 3.

Effect.

Effect.

Example No. 4.

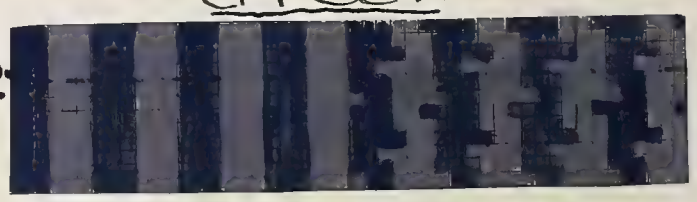
Weave & Colour.



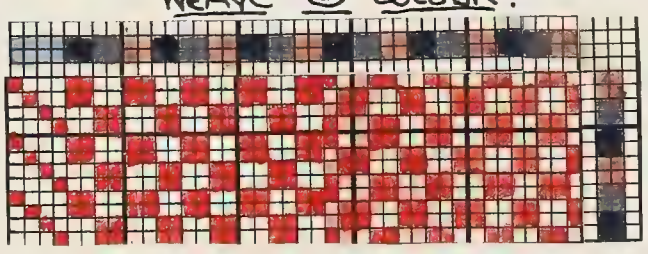
Weave & Colour.

Expl. 6.

Effect.



Weave & Colour.



Example No. 7.

Effect.

Example VII. This design produces what is termed a "Basket Effect." It can be suitably applied to the following particulars:-

Warp. $\left\{\begin{array}{l}\frac{2}{48}\text{'s Botty.}\\ 76\text{ Bfd. Set } (84\frac{4}{9}\text{ths per 1".})\end{array}\right.$ Weft. $\left\{\begin{array}{l}\frac{1}{24}\text{'s Botty.}\\ 70\text{ pks per 1".}\end{array}\right.$

A pattern of a "Basket Effect" cloth is shown further on.

Lecture 15. Uses of Extra Material. Janr. 29.

Extra material may be used in a cloth for 3 purposes, namely :-
(1.) For weight, (2) For figure, +(3) for weight + figure in combination.
It may be used in 3 ways :- (a) as extra warp, (b) as extra weft, + (c), (though rarely) as both, in one cloth. The advantages + disadvantages of extra warps, with those of extra weft may be seen from the list drawn up on a mounting-sheet. On the whole, extra warps is perhaps more used in lighter dress goods, + in decorative fabrics, + extra weft in the heavier cloths, such as winter vestings. The chief recommendation of extra warps is the possibility of increased production (i.e. larger + quicker output.) The difficulty in taking-up for extra weft cloths, is well illustrated in example "C" shown on mounting sheet. In parts of this cloth is is necessary to have 120 pks to the 1" (1 pk. ground + 1 pk. figure) whilst the ground must only have 60 per 1". If 60 pks. per 1" were put in throughout the cloth, the figure would be elongated, + the ground would be open across the piece, in stripes, where the figures appear. This special taking up must be arranged for. In light, flimsy fabrics with extra wp. or wf. spots the material, where not needed is usually floated at the back of the cloth, + afterwards cut off so as not to show through. The expence of this cutting is partially alleviated by a sale of the waste extra material, which is usually an expensive material. In thick cloths, though, the extra material is usually stitched into the back of the cloth, where not required on the surface.

P.T.O.

Lecture 15. (Cont.) **Uses of Extra Material (Cont.)**

Example (a) Shows extra weft used for increased weight.

Warp
2/40's Botany.
60 thds per 1".

Weft.
{ 1 pick 1/2 w's Botny. for face.
{ 1 pick 10 skns. Woollen for back.
120 pks. per 1".

Weaves - { 2/2 twill - face.
{ 8 end Sateen - back.

Example (b). This is a simple figure to be developed by extra-weft on plain weave ground.

Warp.
2/60's Botany.
25's reed 2's

Weft.
1 pick 1/30's Botany (Ground.)
1 pk. 40's 2/2 fold Glowed silk - figure.
100 pks. per 1".

(b.b.) shows design for above fully developed.

The pattern of Madras Muslin shown further back (under heading "Gauzes") is an example of extra-weft being used to make the figure, the floats on the back having been cut away.

Lecture 16. **Uses of Extra Materials (Cont.)** Feb. 5th '13

Example C. is a simple idea for a reversible cloth, such as are commonly used for carriage-rugs etc. In this example the extra material is used for wt. + figure in combination.

Wp. 2/20's White cotton
40 thds. per 1"

Wf. 1 pk 5 skns Red Woollen.
1 pk 5 " Blue " .
80 pks per 1".

Example CC shows the full design-plan for the above.

P.T.O.

CONTINUATION.

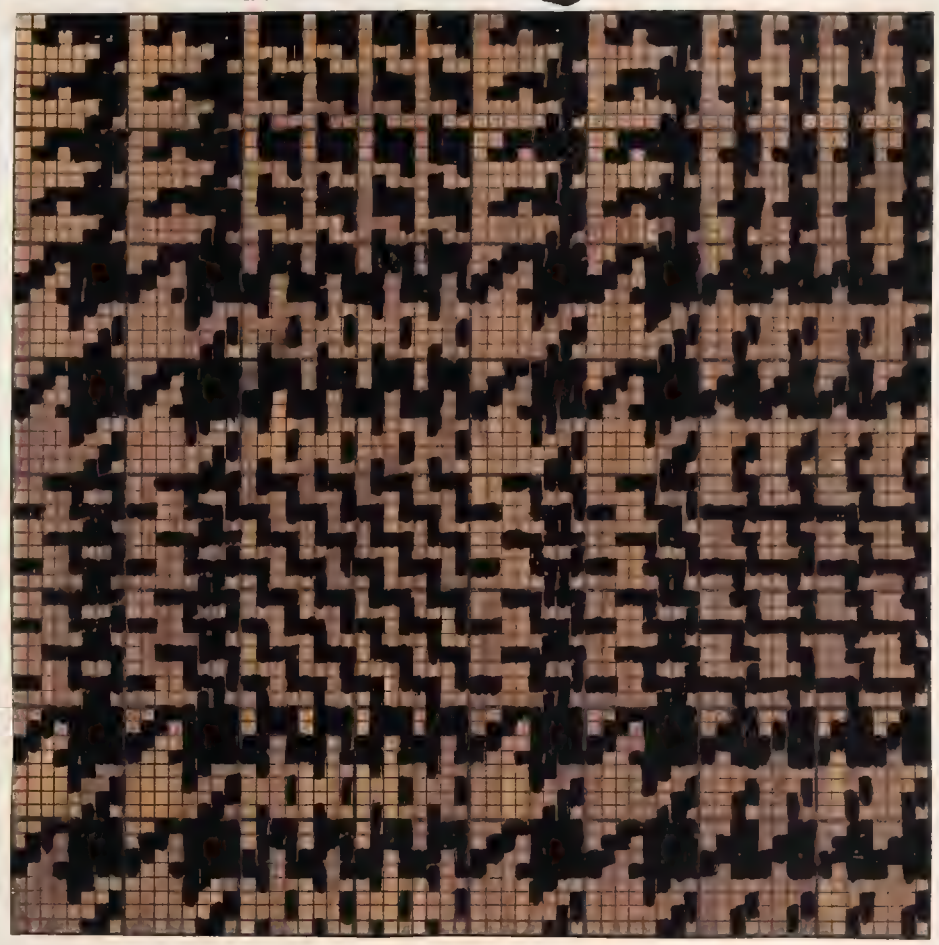
LECTURE No. 11.

EXAMPLE 5.

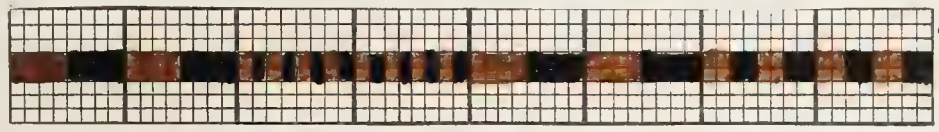
"A" = ORDER OF WEFTING

"B" = ORDER OF WARPING

"C" = WEAVE ($\frac{2}{2}$ TWILL)



EFFECTIVE CHECK PATTERN ON 64 THDS. BY 64 PKS.



PRODUCED BY METHOD No. 3.

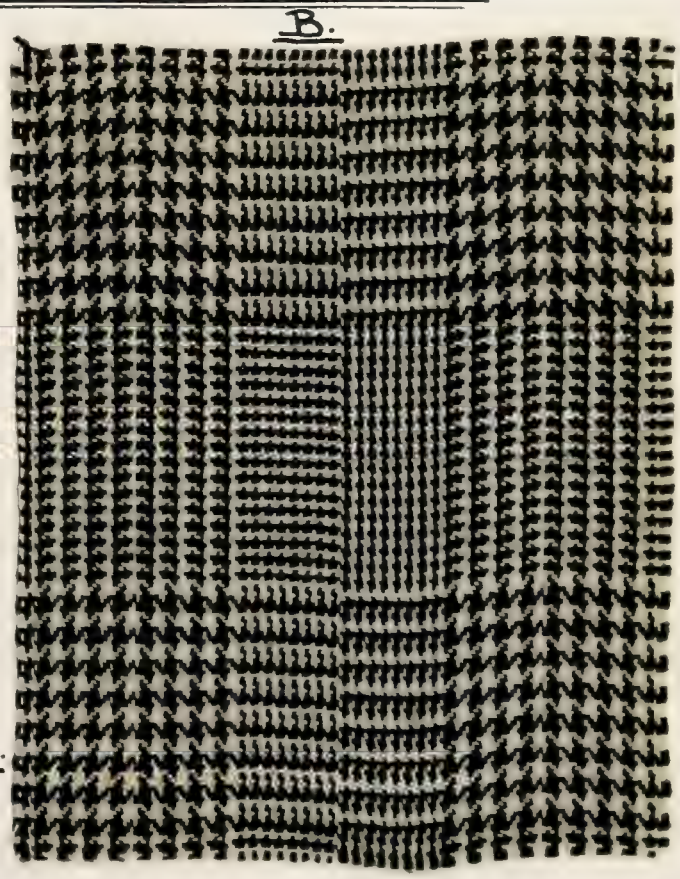
A.

2 CHECK PATTERNS.

A: $\frac{2}{2}$ HOPSACK.

B: $\frac{2}{2}$ TWILL.

B.



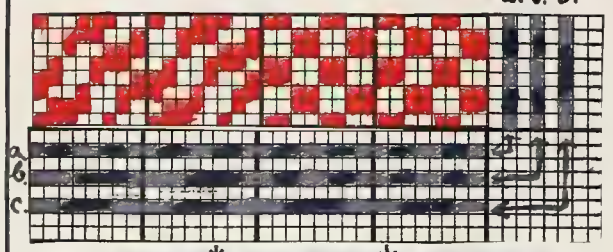
Lecture No. 12.

Checks & Stripes.

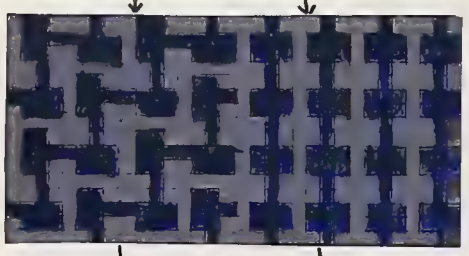
Method 3.

Colour & Weave.

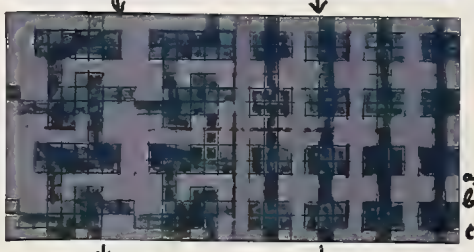
Example 8.



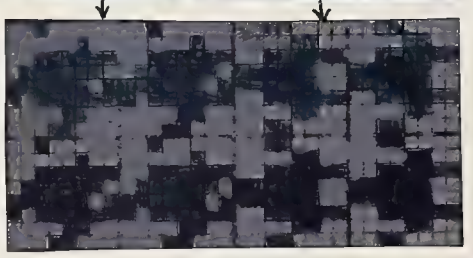
8a.



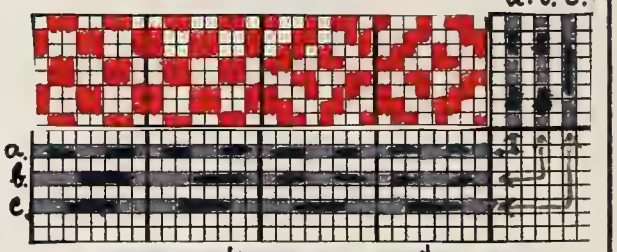
8b.



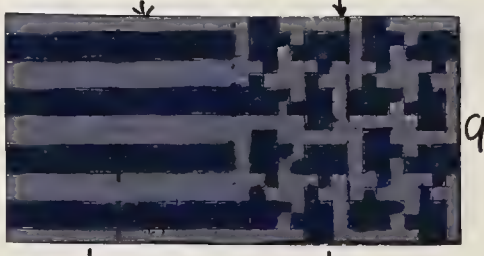
8c.



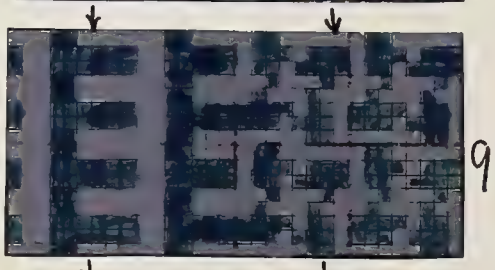
Exple. 9.



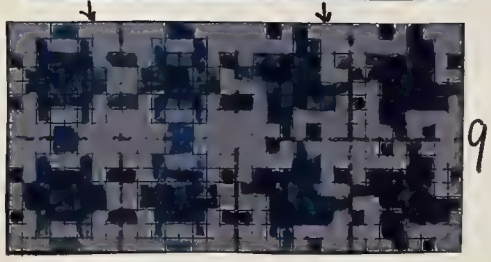
9a.



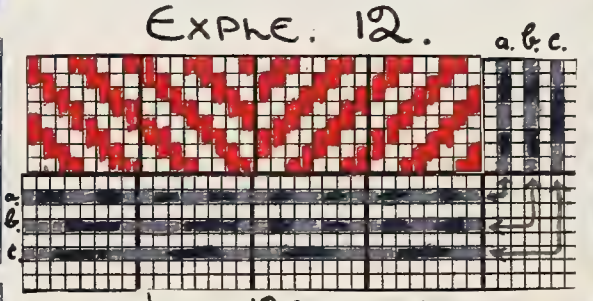
9b.



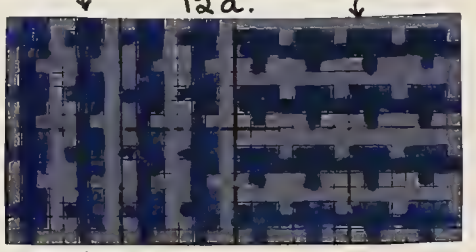
9c.



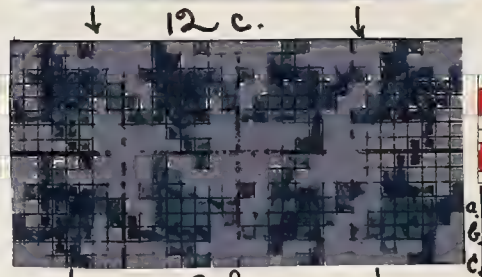
Exple. 12.



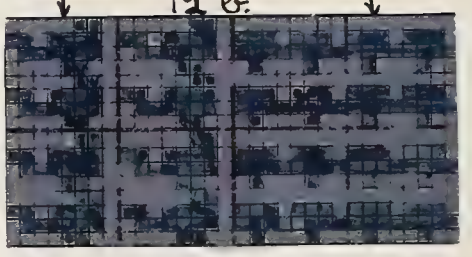
12a.



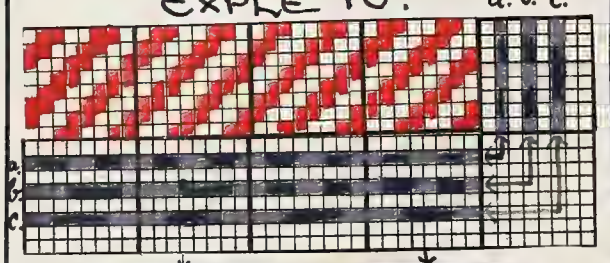
12c.



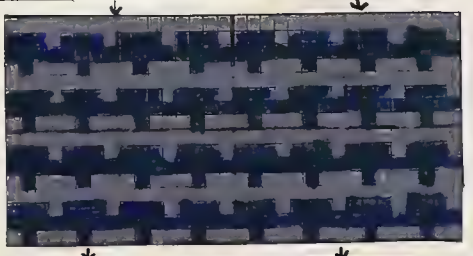
12b.



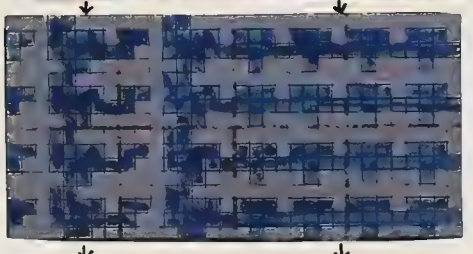
Exple 10.



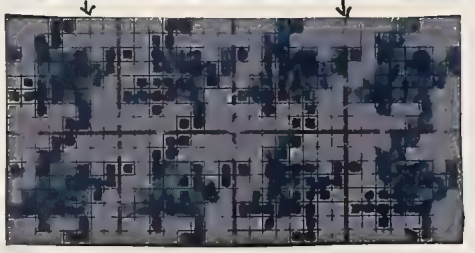
10a.



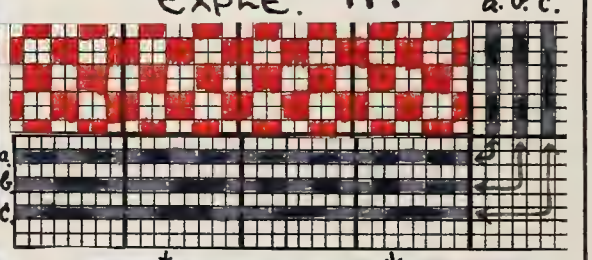
10b.



10c.

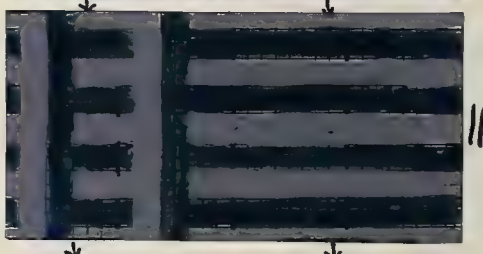


Exple. 11.

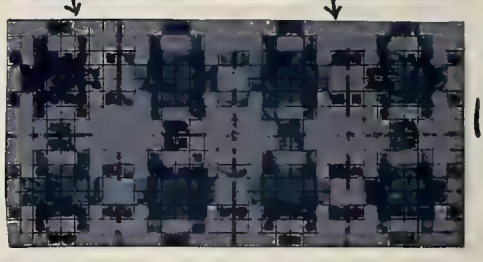


11a.

11b.



11c.



Lecture 16 (Cont.) Uses of Extra Material (Cont.)

Extra Warp-Backing.

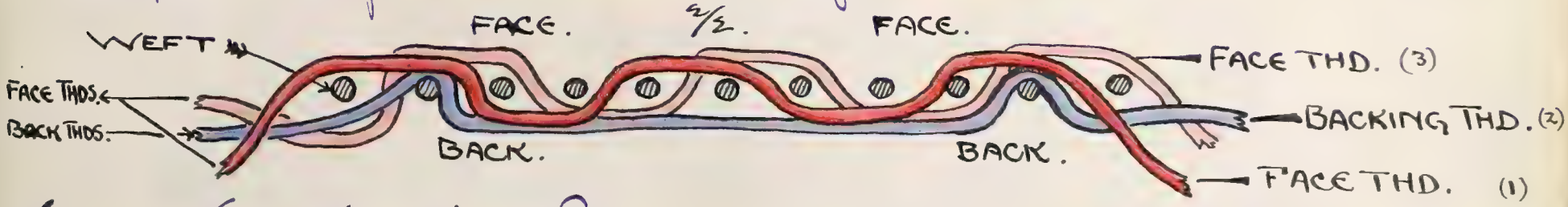
In wp.-wf. back styles, there are 2 main points to decide :-
(1.) The relative proportion of face & backing thds; namely 1 face, 1 back, or 2 face, 1 back, or 3 face, 1 back.
(2.) The binding of the backing thds in order that :-
(a) They are totally hidden on the face of the fabric.
(b) The wp. may have a suitable length of float, to produce a firm yet soft handling cloth.

The proportion of face thds. to back thds. is decided by the additional wt. required, & the weave of the single-cloth.
Even distribution of the binding places must be effected if at all possible, satteen orders being very useful & popular.
The length of the backing wp. float will usually be decided by the position of the suitable binding or stitching places. Long floats (in wool fabrics) allow shrinkage, & produce a soft handle on the back.

Example I. Illustrates the 2/2 twill backed with wp., thd. & thd. (Note :- in all designs for backed styles, marks = warp, unless otherwise stated.)

Wp. 2/40's Boty. 120 thds per 1". 64" loom width.
Wf. 1/20's Boty. 60 pks per 1" 56" finished width.

A wp. section of this cloth would be as given below :-



Example II. Same loom Particulars as above (Ex I.), but in this case Twill hopsack is backed end end with wp. (This is the weave for the stripe in the white pattern (on mounting sheet) of wp. backed cloth.)

The designs for Examples 1 & 2, will be found further on in book.

P.T.O.

Lecture 16 (Cont.) Uses of Extra Material. (Cont.)

The Drafting of Wp.-backed Styles.

The principle is very similar to that used in drafting combinations of 2 twills – i.e. there are 2 sets of Thds. drawn onto 2 separate sets of heads, face & back. It is questionable which is the best arrangement, the face heads at the front, or at the back. In the following examples of drafting, the face thds. are put at the front.

(1.) Heald Order for Example I. Draft "A". (See Ex. 1 on last page.)

120 thds per 1" × 64" wide = 7680 ends in Wp.

7680 ÷ 16 thds in design = 480 repts of patt. across piece.

480 × 2 : 960 mails on each of 1st 4 shafts. } H.O.

480 × 1 : 480 " " " . back 8 " . }

(2.) H.O. for Ex. I (as above) but, Draft "B"

7680 ÷ 16 = 480 repts of Pattern.

480 × 1 = 480 mails on each of 16 shafts. } H.O.

Draft "B" (2.) is more convenient than "A", as it can be used, afterwards, if required, for any 8 end face & back weave, or for double-cloth weaving. There is more "scope" in draft "B", than "A".

On a mounting-page will be found examples of wp. backed designs (& cloths) along with Drafts, Peg-plans etc.

LECT. 17. Extra Wp. Backing. (Cont.) Feb. 12th.

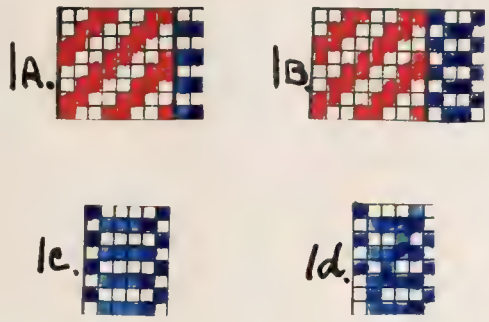
Examp. 3. Bk. thd. & thd., the pinhead effect given at weave 88. To reproduce this, 2-warp beams will be req'd, & 20 shafts.

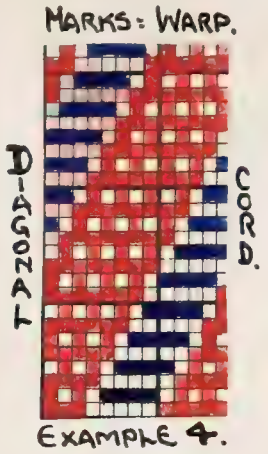
Examp. 4. Back with wp., thd. & thd., the enays twill.

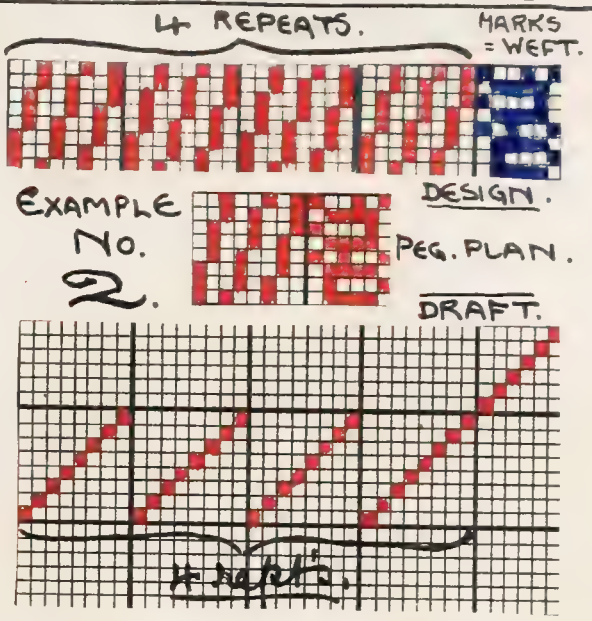
4A. Shows an 8-end Satteen binding which is imperfect as the stitching places are & not, for the most part, hidden on the face of the

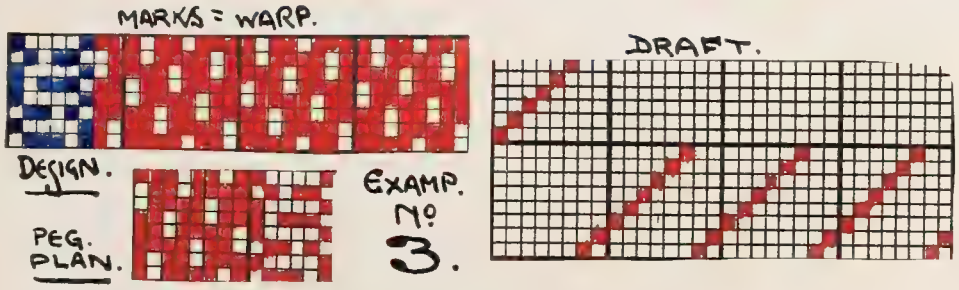
Lecture 13.

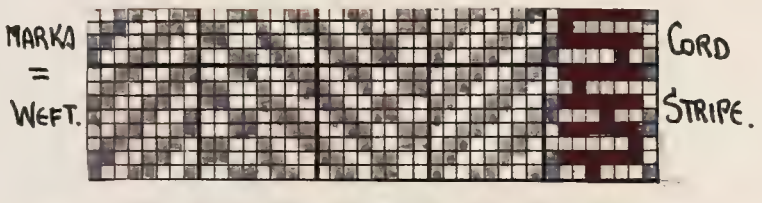
Piping Effects.

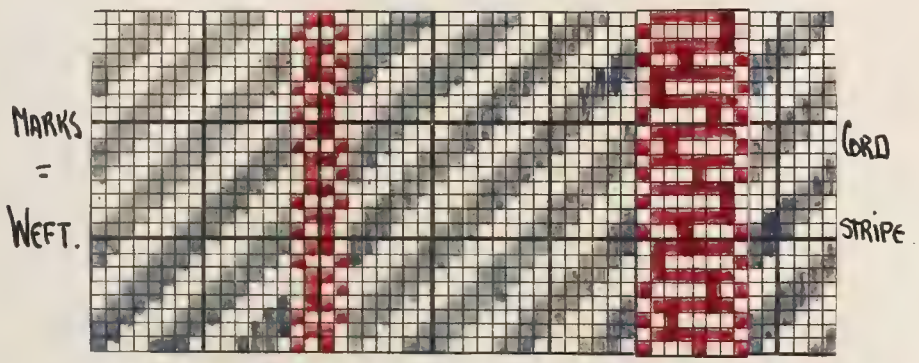


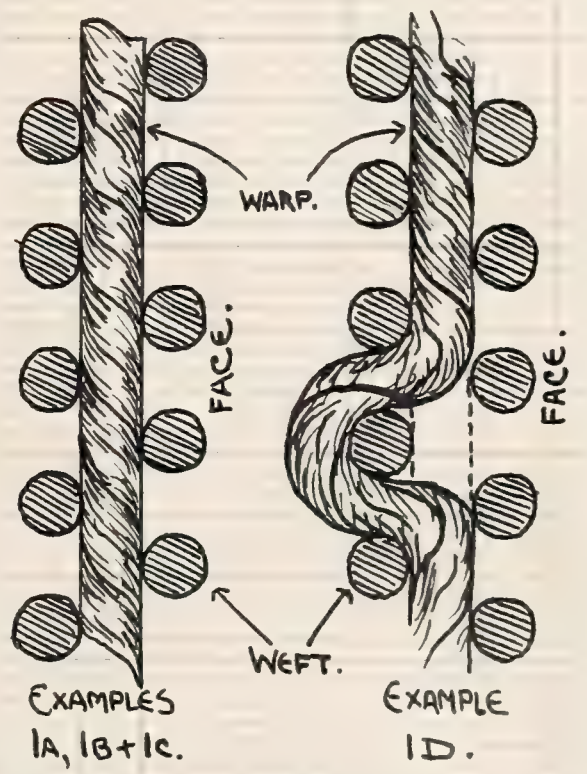


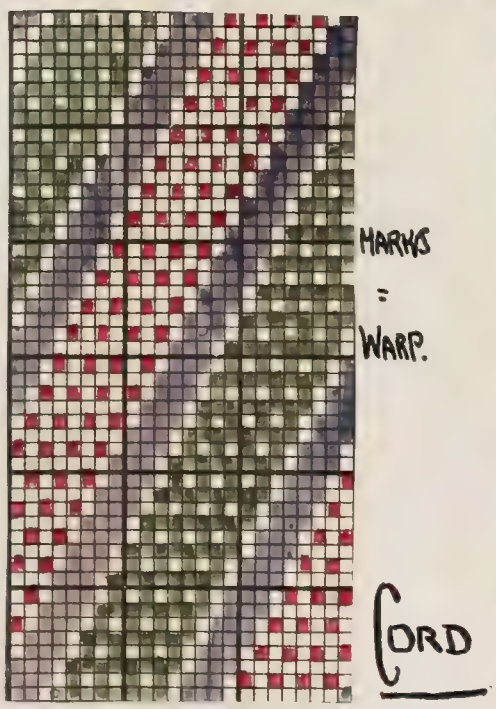


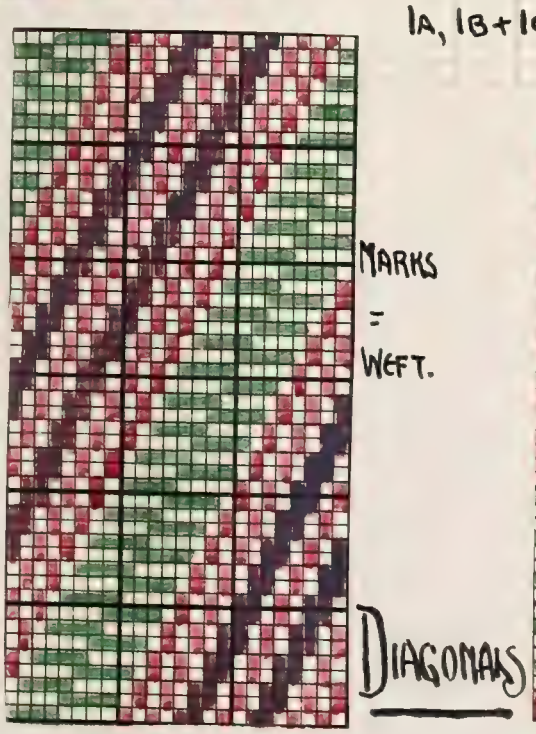


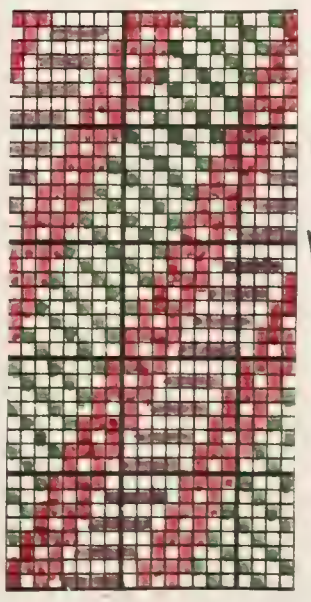








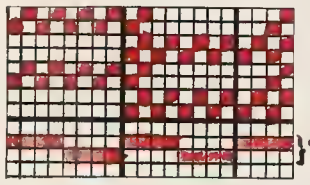




Lecture 14.

Corduroys.

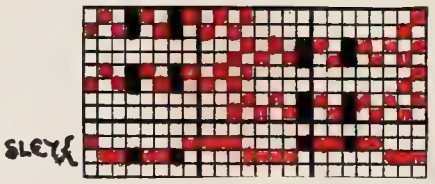
Example V.



Sley.

Weft Section.

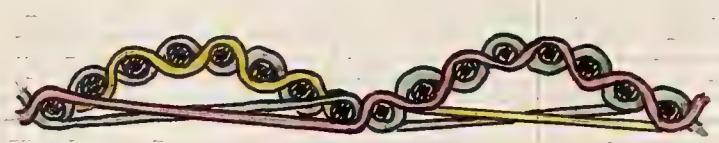
Marks
equal
Weft.



Sley

Example VI.

Weft Section.



Ordinary Corduroy.

Cords with wadding thds.

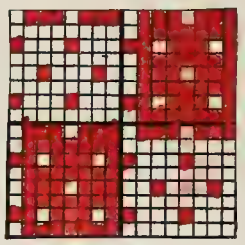
Weft Section of Corduroy Styles.

Basket Styles.

Basket Style

Pattern.

Example
No. 7.



Marks
=
Ward.

Basket
Weave.

cloth, but show in a twill order. See pattern for SINGLE CLOTH MAYO.

Ex. 4B. Illustrates the best binding for the mayo twill, when backed Thd & Thd. ½ the binding places are more or less imperfect, but as these are regularly distributed (NOT in twill order), the appearance on the face of the cloth is reasonably perfect.

NOTE. The Single cloth weave controlls, in many cases, the order of face thds. to back thds. For example, Design 4, when arranged 2 thds. face & 1 thd. back offers perfect stitching places.

Ex. 4C. Shows Mayo backed: 2 face, 1 back, so as to give perfect binding.

Example 5. Back with Wp., thd. & thd., weave 8⅔, (of which there is a single cloth pattern on mounting sheet.)

WADDING PICKS.

Pattern 3. Is an Extra Wp. & Wf. cloth, made to following particulars:—

Wp. 1 thd. 2/36 Botty. (face.)
1 thd. 2/36 Botty. (back.)
120 thds. per 1"

Wf. 2 pks 1/20's Botty
1 pks 8 skeins Woollen (Wadding pick)
90 pks per 1".

Example 6. Shows a design which could be very well applied to above particls, & which is :- 2/2 twill backed thd. & thd. with wp., & has a wadding pick (extra) thrown in once every 3 pks., to give weight & solidity to the cloth.

The Wadding pick floats between the face & the back warps, thus, when designing it must be noted that the face wp. is all up, & the Back wp. all down when the wadding pk. is thrown across.

See sheet for examples above, worked out with Drafts & Peg Plans.

1913.

Lecture 18. Extra Weft Backing. February 19.

The principles are similar to those followed in designing Warp-backed styles. Tying in this case, is effected between 2 weft floats + it will be found most convenient for marks to = weft in designs.

Examp. I. Shows the 8-end diagonal backed pk. & pk., with weft.
The following particulars could be applied for suitable cloth to result.

Wp. 2/48's Botty, 15's reed, 4's

Wf. 1 pk 1/24's Botty (face)
1 pk 12 skns Woollen (back)
110 pks per 1"

Examp. II. is the well-known 3 shaft Corkscrew, backed with weft 1 + 1. The tie given is the best possible.

Wp. { 2/60's Botty, 106 ends per 1".

Wf. { 1/30's Botany, 200 picks per 1".

Examp. III. is a whipcord design on 12 pks. + 6 ends. to be backed pk. + pk. with extra weft. The 11-floats of weft on the back are not very long as the wp. is fine set, but they are long enough to give a soft handle to the cloth. The 11-float arrangement of the backing weft is better than the 5-float design, which is also possible, as the 5-floats are only 5/106" long, + ∴ would not give a very soft handle.

Example IV.

This is a Broken Hopsack Weave backed pk. & pk. On every 8th pick, however, we get a rather poor (un-covered) binding-place, but as this occurs at the top of every figure, it is not noticeable.

Example V.

Wp. All Worsted.
2/40's. 64 ends per 1"

Wf.
Face :- 1 pk 2/30's Cotton
Back :- 1 pk 12 skns Woollen.
110 pks per 1"
} approximate particulars

This is a cheap Continental cloth, with the appearance of an all wool fabric. The face is all worsted, the back Woollen, + the cotton is hidden in the middle. The best binding is shown in the design; as any binder will show as an irregularity. This fault

Lecture 15.

The Advantages of Extra Warp & Extra Weft.

Extra Warp.

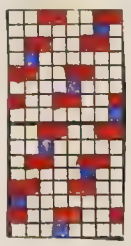
1. One Shuttle only required.
2. No long Box Chain Required.
3. No difficulty in Taking-up.
4. Sooner Woven — 25% more speed.
5. More Colours may be put in the figures etc.
6. There is less waste.

Extra Weft.

1. No Extra Beam Required.
2. No Complex Draft & Peg Plans.
3. No Difficulty in Letting-off.
4. No Extra Figuring Capacity Required.
5. Colours, Material etc. may be more easily altered.
6. Cheaper material may be used.

Design for Extra Weft Figure on 2/2 Twill Ground.

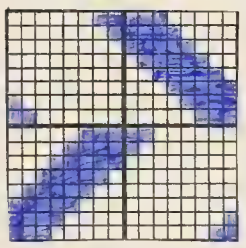
Example "A"



Face: 2/2 twill.
Extra Weft Back Picks, being bound in 3end sateen order.

Example "B".

Extra-Weft Figure.

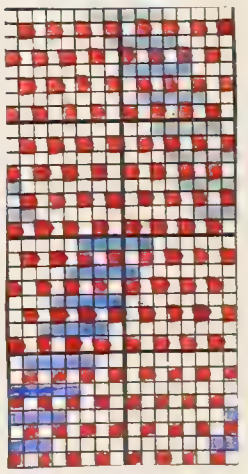


c.

Ground Weave.

d.

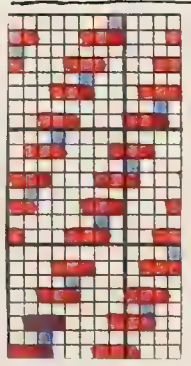
Complete Design for producing C. on D.



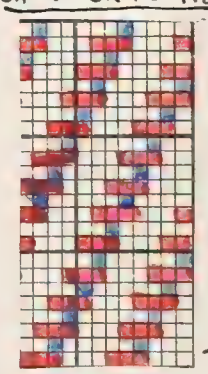
Long Bk. Floats.

Short Bk. Floats.

Method I.



3/3 Twill



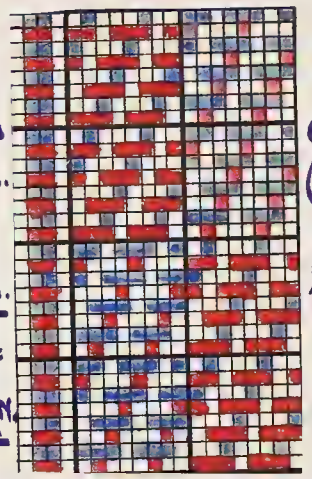
Method II.

12-end Sat. Twill order.

Backed Pk. & Pk. with Extra-Weft in 2 ways.

Lecture 16.

Reversible Cloth.

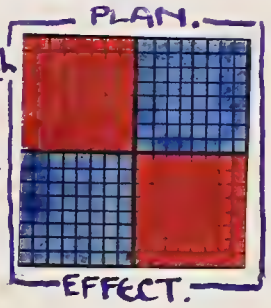


Design.

Red = Red Yn.

Blue = Blue Yn.

Extra Material (weft) used for figure & weight combined.

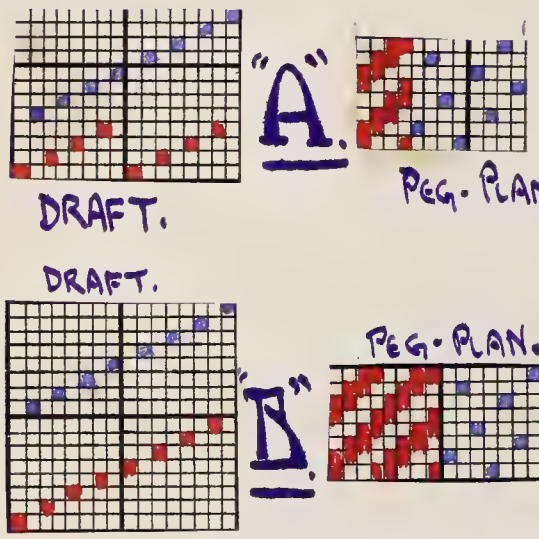


Example "C".

Example No. I.

Design for Ground of Pattern.

Backed, Thd. + Thd., with Warp.



Extra Warp Backed Cloth.

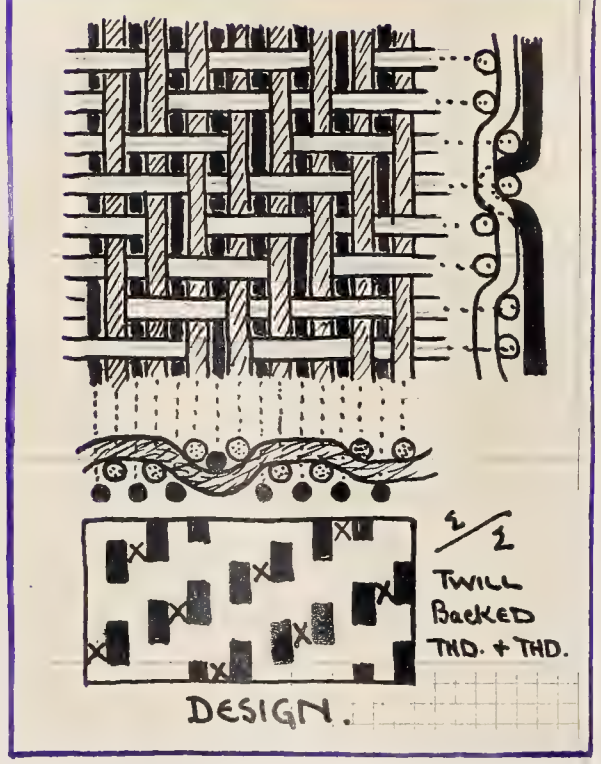
A. Face of Cloth.

B. Back of Cloth.

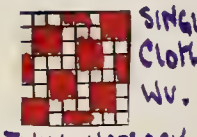
Extra Warp Backed Styles.

Diagramatic Plan of Example I.

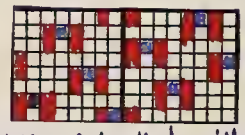
A Ground of above pattern.



Example No. II.

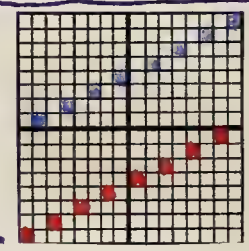


Backing Thds. in 8-end order.



Backed, Thd. + Thd. with Wp.

Best Draft.



Peg-Plan.

Design for Stripe in Pattern.

is evenly distributed over the face of the cloth, to minimise the fault. A twill arrangement of the fault is not so good.

Example 6.

This is the 4-end weft sateen arranged 3-picks face + 1 back. The tying of the backing weft will be in an irregular order, but so arranged as to provide the best stitching places. This weave is much used for low Woollen cloths, with Cotton warp, Woollen face, + Shoddy back.

Various weft-back designs, along with above examples, will be found on a mounting sheet.

Lecture 19. Feb. 25th '13

Imitation Warp & Weft Backed Styles.

Imitation Wp. backed cloths are extensively produced in the light + medium coating trade, + especially in covert coatings. They are actually single cloths the back of which gives the impression of being backed with extra warp. Almost any single weave may be taken + re-arranged in order that the back of the fabric may have the effect mentioned.

"A."		"B."	
Wp.	Wf.	Wp.	Wf.
2/36's Botty. (White) 60 ends per 1"	2/36's Botty (Black) 60 pks. per 1".	2/36's white Botty. 120 ends per 1".	2/36's Black Botty. 60 pks per 1".

2/2 twill appearance on face of each.

If the design in example I be applied to (b.), a perfect imitation wp. backed style will result, with 2/2 twill on the face, + a wp. sateen appearance on the back.

If, however, plain 2/2 twill be applied to (b.) an imperfect structure

will result, & unequal sized blk. & wh. twill lines, running at an angle of 70° owing to twice as many mns. as pks. per 1", will be the effect on the face of the cloth. (Broad wh. & thin black lines.) This design is perfectly suited, however for particulars (a.), which however, would not suit the design at Ex. I at all.

Example I. is a 2/2 twill re-arranged 1nd 1nd to produce an imitation wp.-back. It will be observed that every wp. 1nd. possesses the same no. of interlacings; & that these cloths can be woven on Tappet-looms, as Ex. I., for instance is only on 4 mns. x 4 pks.

Examp II. This shows the 2/2 twill arranged 2 1nd. face & 1 1nd back. This design is however, defective, as we get some 3 floats of weft on the face along with 2 floats, whereas all weft floats must be equal in length. (ditto Wp. floats), to give the desired 2/2 twill effect on the face.

Example II A. Shows the best design giving the desired effect on the surface. (11 mns. x 11 pks.)

Loom Partic's. { Wp. 2/36's White Bst. 90 mns per 1" Wf. 2/36's Blk. Botty. 60 pks. per 1".

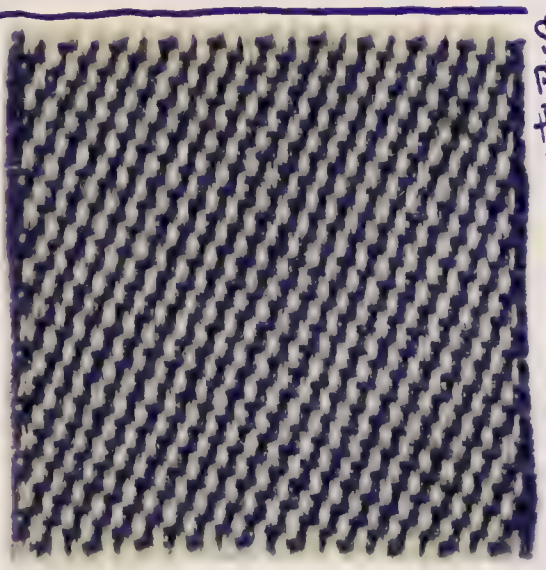
Patterns I & II. are Weft-backed styles (Imitation)
I = perfect cloth (i.e. the right no. of mns & pks. per 1" have been put in)
II = a defective (useless) cloth, as an insufficient no. of pks. per 1" have been put in; - thus the absence of the 2/2 appearance on the face of the fabric, & looseness of the back is caused.

Example 3. Shows the twill Hopsack to be arranged 1nd. & 1nd. weave is on 14 x 14, & if applied to above particulars (II a), should have 120 mns & 60 pks. per 1".

Examp. 4. A. is the Twill Hopsack arranged 2 face & 1 back. (Marks = wp.) & could be applied to the identical particulars as Examp II a.
This design won't give the exact single-cloth weave on the face, as the hopsacks will be smaller, & the wf. floats longer, which is rather a fault.

P.T.D.

LECTURE 17.



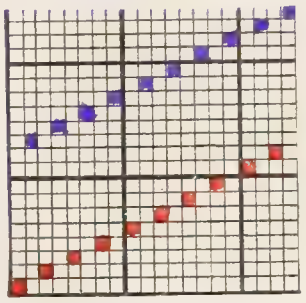
SINGLE-CLOTH Pattern for this weave →

EXAMPLE V.

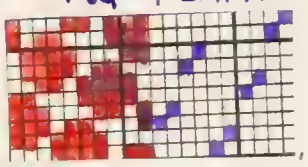
MARKS: WARP.

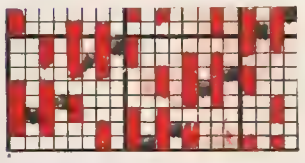
WEAVE 83.

DRAFT.



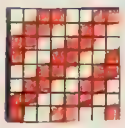
PEG-PLAN.





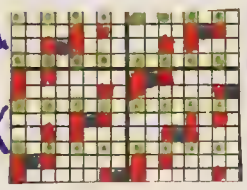
Weave 83, Backed with ex. Wp.

EXAMPLE 6.



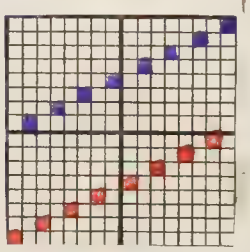
4/2 twill. Single cloth Weave.

Backed Thd. + Thd. with warp. GREEN = WADDING-PICK.

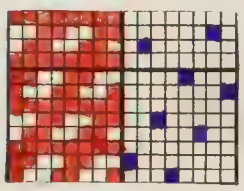


WEAVE for GROUND OF THIS PATTERN.

DRAFT.



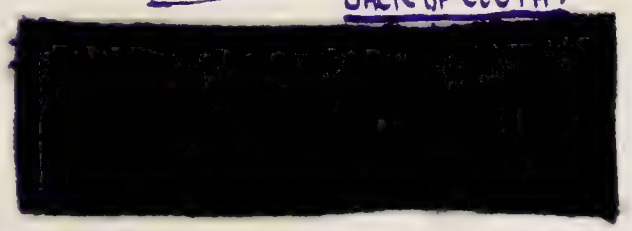
PEG PLAN.



FACE OF CLOTH.

CLOTH WITH WADDING PK.

BACK OF CLOTH.

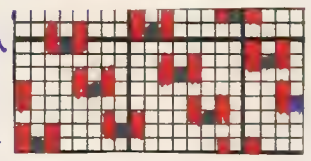


EXAMPLE 3.

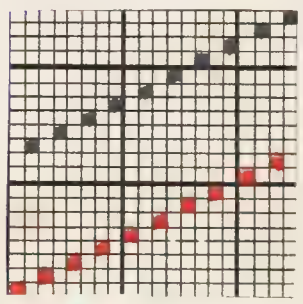
WEAVE

88.

Backed with Wp.

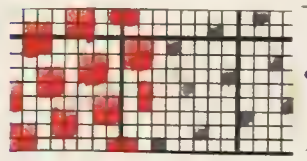


Thd. & Thd.



DRAFT.

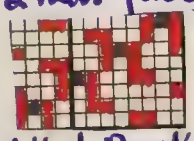
PEG-PLAN.



EXAMPLE 4.

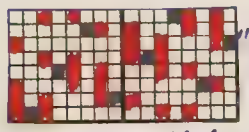
"C."

BACKED, 2 Thds face,



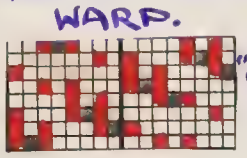
1 Thd Back, with extra Wp.

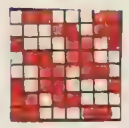
"A."



BACKED. Thd. + thd. with extra WARP.

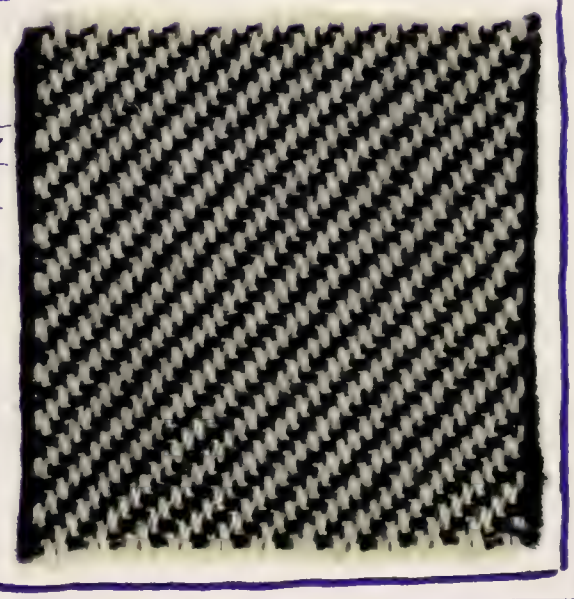
"B."





MAYO TWILL.

SINGLE-CLOTH Pattern for this weave →



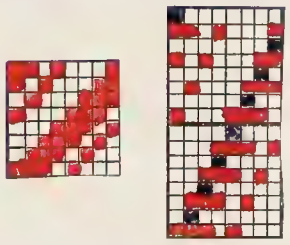
MARKS: WARP.

LECTURE 18.

TWILL FANCY WEAVES.

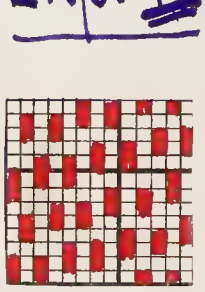
EXAMPLE I.

8 end DIAG.

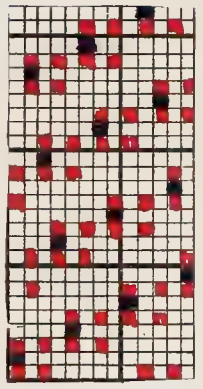


1 face, 1 Bk.

Exp. II.



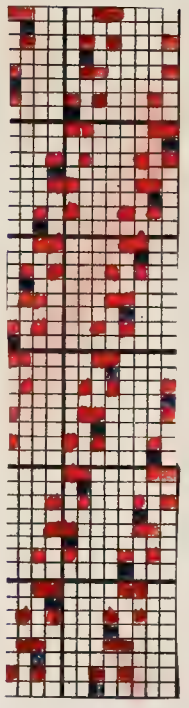
13-shaft CROSSCREW.



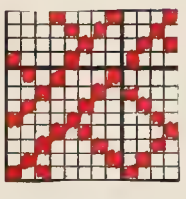
1 Face, 1 Bk.

EXAMPLE III.

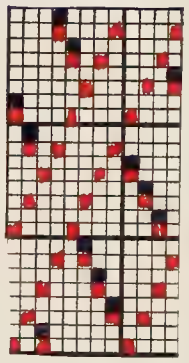
1 Face, 1 Bk.



EXAMPLE V.



1 Face, 1 Back.

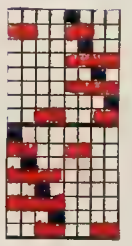


EXAMPLE VI.

4 end Weft Sateen.

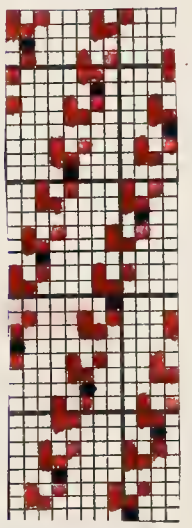
3 Face. 1 Back.

EXAMPLE IV.



3 DESIGNS FOR EVEN-PICK LOOM.

2 Face 1 BACK.

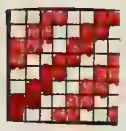


WHIPCORD FACE.

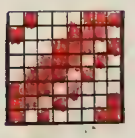
Face Weave.

4 end Weft Sateen

4 face. 2 Back.



Face Weaves.



A.

2 Face 2 BACK.

Poor Arrangement for Binders.

B.

Lecture 19. (cont.) Imitation W.P. Fig. Backed Fabrics (cont.)

Examp. 4B gives slightly bolder effect on the face than in the
Single cloth Ex. The hop sacks are larger & the weft floats longer
Examp 4C. gives Big hop sacks but small weft floats.

The above examples (4A, B & C) are 3 weaves all of which will result in some slight alteration in the appearance of the face weave, from that of the Single cloth

Example 5. This is the weave for the whole pattern, ie 3/2 hop-sack arranged Pick & Pick.

The above examples will be found worked out on a repeating sheet, along with patterns, Harness etc.

Lecture 20. Extra Weft Backing (cont.) Appnd 2.

Examples 7 & 8, illustrate the binding of the backing pics, introduced on the face weave - By using suitable cutting particulars, much time may be saved in designing the two examples, the cutting particulars will be — Cut each pick twice

1st Cut all but Red
2nd " " " Blue

Extra Warp Figuring.

W.P. Used 70's Boly for grd
Used 40's " for Silk for figure
90 Ends per 1" (90 set Harness).

W.P. 70's Boly
58 pairs per "
End. weave & Plain (for grd)

Ex 10. Illustrates a section of the design necessary when employing the ordinary harness. A 90's set ordinary Bly harness, with 30 extra heddles gives 300 ÷ 100 Ends per 1", = 3" Single Rep of pattern

Lecture 19. (Cont.) Imitation Wp. & Wf. backed Styles (Cont.)

Examp. 4B. gives slightly bolder effect on the face than in the single cloth
Examp 4C. i.e. The hopsacks are larger & the weft floats longer.
gives Big hopsacks, but small weft floats.

The above examples (4A, B & C) are 3 weaves, all of which will result in some slight alteration in the appearance of the face weave, from that of the single cloth.

Example 5. This is the weave for the white pattern; i.e. 4/4 hopsack arranged pick & pick.

The above examples will be found worked out on a mounting sheet, along with patterns, diagrams, etc.

Lecture 20. Extra Weft Backing (Cont.) April 2.

Examples 7 & 8, Illustrate the binding of the backing pks., introduced on the face weave. By giving suitable cutting particulars, much time may be saved in designing. In both examples, the cutting particulars will be — Cut each pick twice

{ 1st Cut all but Red
{ 2nd " " " Blue

Extra Warp Figuring.

Wp 1 Mod 2/60's Boly for grd
1 Mod 40's 2 fold Silk for figure
100 Mds per 1" (90 set Harness)

Wf 30's Boly
50 pks. per 1"
Grd. weave = plain.

(8x4 point paper should be used for ord. harness)

Ex. 1A. illustrates a section of the design necessary when employing an ordinary harness. A 90's set ordinary Bfd. harness, with 304 uprights, gives 304 ÷ 100 Mds per ", = 3" Size of 1 repeat of pattern.

Lecture 20. **Extra Warp Figuring (Cont.)**

As a plain weave texture is more conveniently + efficiently woven by means of heald shafts, the harness + shaft mounting shown at Ex. 13. could be used with advantage. In Ex. 13, the 1st. Gnd. Ends are drawn onto 2 healds in front of the harness, + the figuring silk Ends. only, are drawn through the mails. The advantages of such a mounting are, 1st, increased figuring capacity.

Examp. (1) 304 ÷ 50 harness Ends per 1" = 6" Size of 1 rept.

(2) Designing is simplified as only the figure Ends need be indicated (8×8 paper in this case) as shown in 1c.

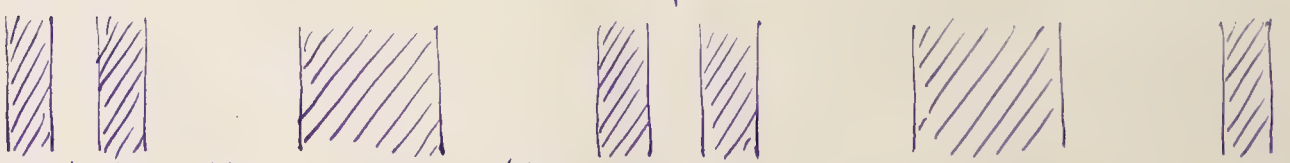
Lect. 21. **Extra Wp. Figuring (Cont.)** April 9th.

Examp. "a". Illustrates the production of extra wp. figured styles, in the form of Crammed Stripes, the wp. Ends being arranged intermittently to form the figured Stripes.

Wp 2/60's Combed + Gassed, Bleached Cotton for ground (mercerized)
2/60's Coloured ditto. for extra.
35's reed 2's.

~~Wp~~ 2/60's ordinary Cotton 50 pks per 1".

The Striping occurs as follows :—



3" repeat.

Warping Plan

18 times { 1 Hd Extra
1 Hd Wh. Gnd.
18 Wh. Gnd.
18 { 1 Extra
1 Gnd.
(or) 54 Gnd.
54 { 1 Ex.
1 Gnd
(*) 54 Gnd.

Start (*)
Finish (⊘)

Cloth = 30" wide.

108 dents in 1 rept in reed.
10 repts, minus 1 broad Stripe.
35 × 30 = 1050 - Total no. of Dents.
1050 ÷ 108 = 9 repts + 78 dents.

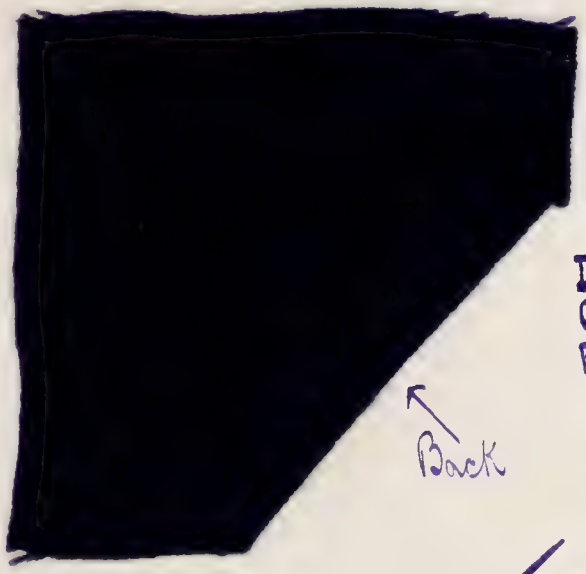
P.T.O.

LECTURE 19.

face effect = 2/2 twill.

A. B.

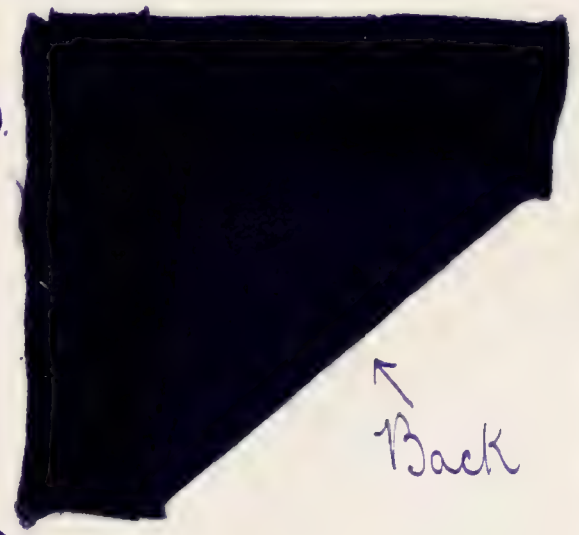
Weave for Patterns A & B.



Back

Defective CLOTH; too few Picks per 1"

PERFECT STRUCTURE



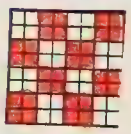
Back

EXTRA-WEFT

IMITATION

BACKED STYLES

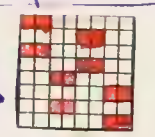
Face weave



FOUREND Hopsack

Back.

Complete Design.



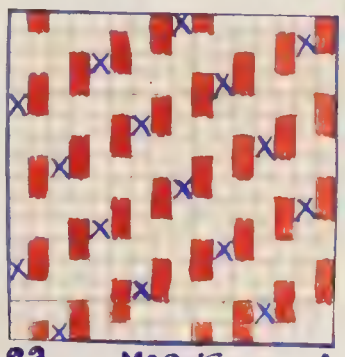
1 face
1 back } IMITATION.

WARP-WAY SECTION.

2.1.3.

"REAL"

WP. BK. Style.



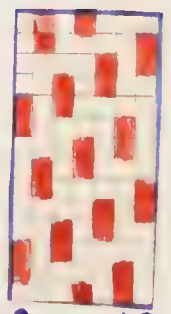
23. MARKS = WP. 1.

2/2 Twill face.

COMPARISON OF REAL & IMITATION WARP-BACKED STYLES.

"IMITATION"

WP. BK. Style.



3. 1.2. MKS. = WP.

2/2 Twill face.

3. 2. 1.

WARP-WAY SECTION.

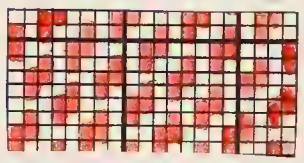
Lecture 19.

3/4 TWILL.

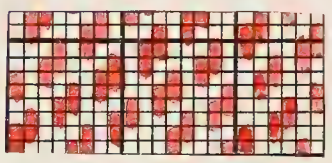
ORDINARY WEAVE.

EXAMPLE I.

II



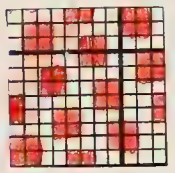
IIA.



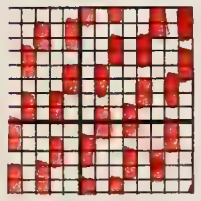
See NOTES.

TWILL HOPSACK.

ORDINARY WEAVE.



4A.

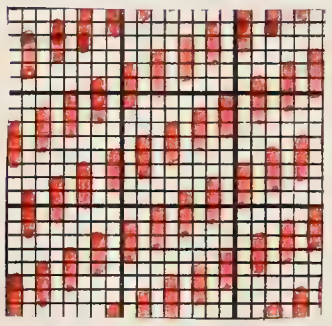


4B.

4C.

IMITATION WARP-BACKED STYLES.

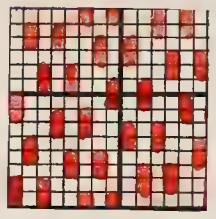
3/3 TWILL BASE.



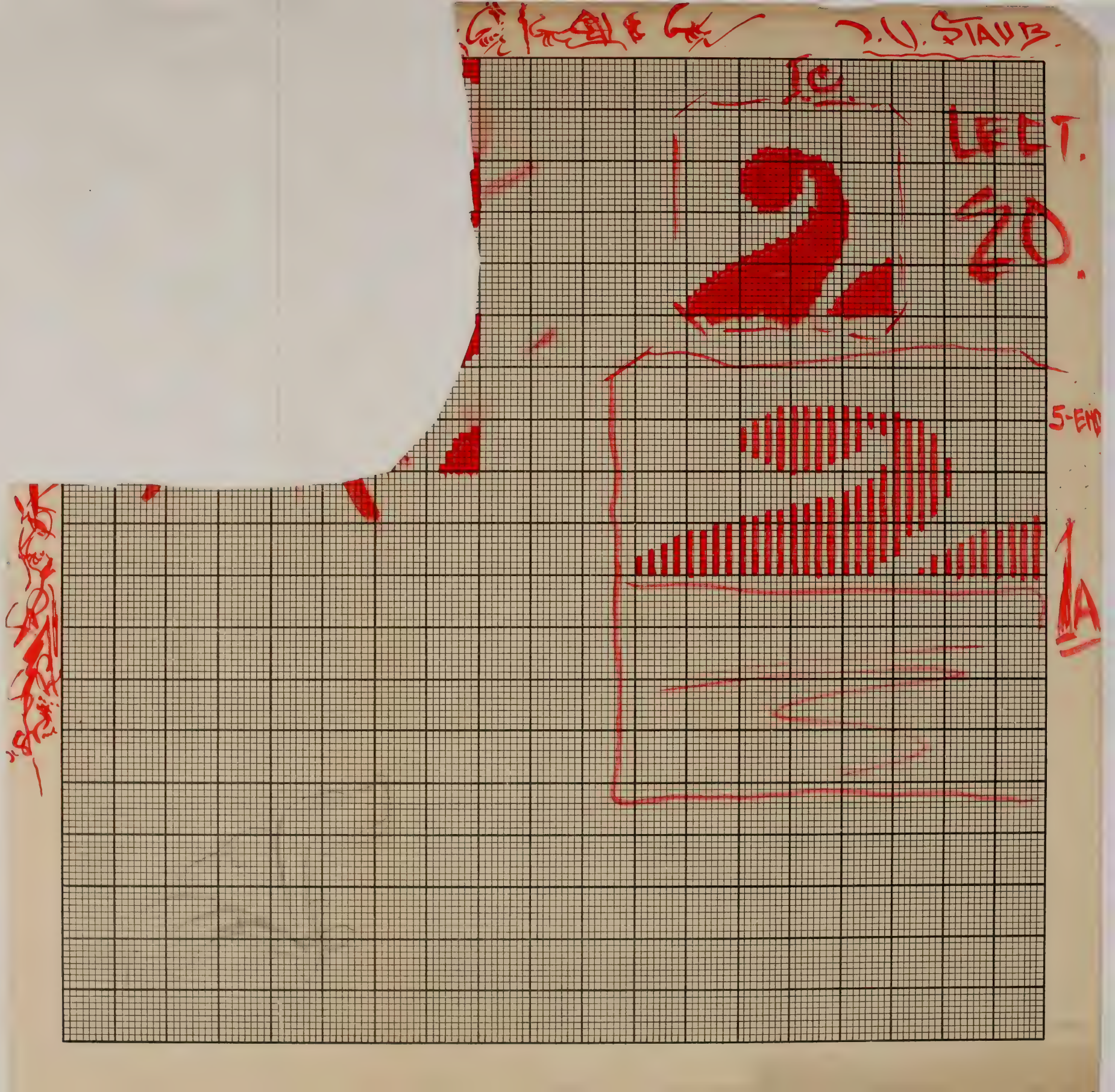
EXERCISE.

ORDINARY WEAVE.

TWILL HOPSACK.



EXAMP. 3.


J. V. STAUB
LEFT
20.
5-END
1A

Lect. 21 (Cont) **Extra Wp. Figuring. (Cont.)**

No. of wh. grnd thds. = 216 } 306 thds in 1 rep't.
" " Extra Col'd " = 90 }

90 x 9 rep'ts = 810 Col. thds, + 36 over rep't = 846 col. thds in Wp.
216 x 9 = 1944 grnd " , + 162 " " = 2106 grnd " " "

∴ Total no. of thds. on both beams = 2952.

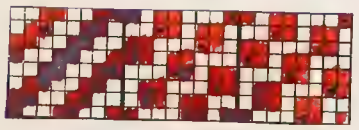
2952 ÷ 30" = Average no. of thds. per 1", = 98½.

The average set must not differ much from the harness set, or the thds. will not be straight from the harness mails to reed, & ∴ not weavable.

See Sley Plan, Design etc. to above Partic's.

LECT. 20.

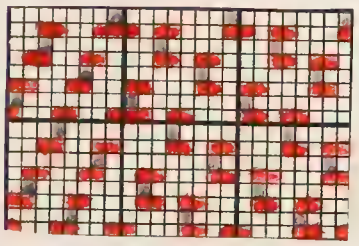
EXTRA WEFT BACKING.



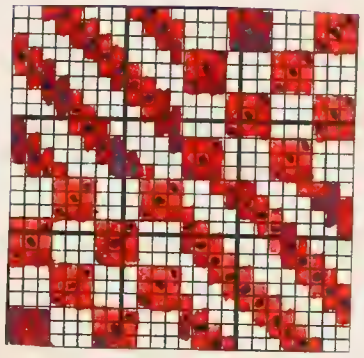
a.

EXAMP. 8.

EXAMPLE 7.



b.

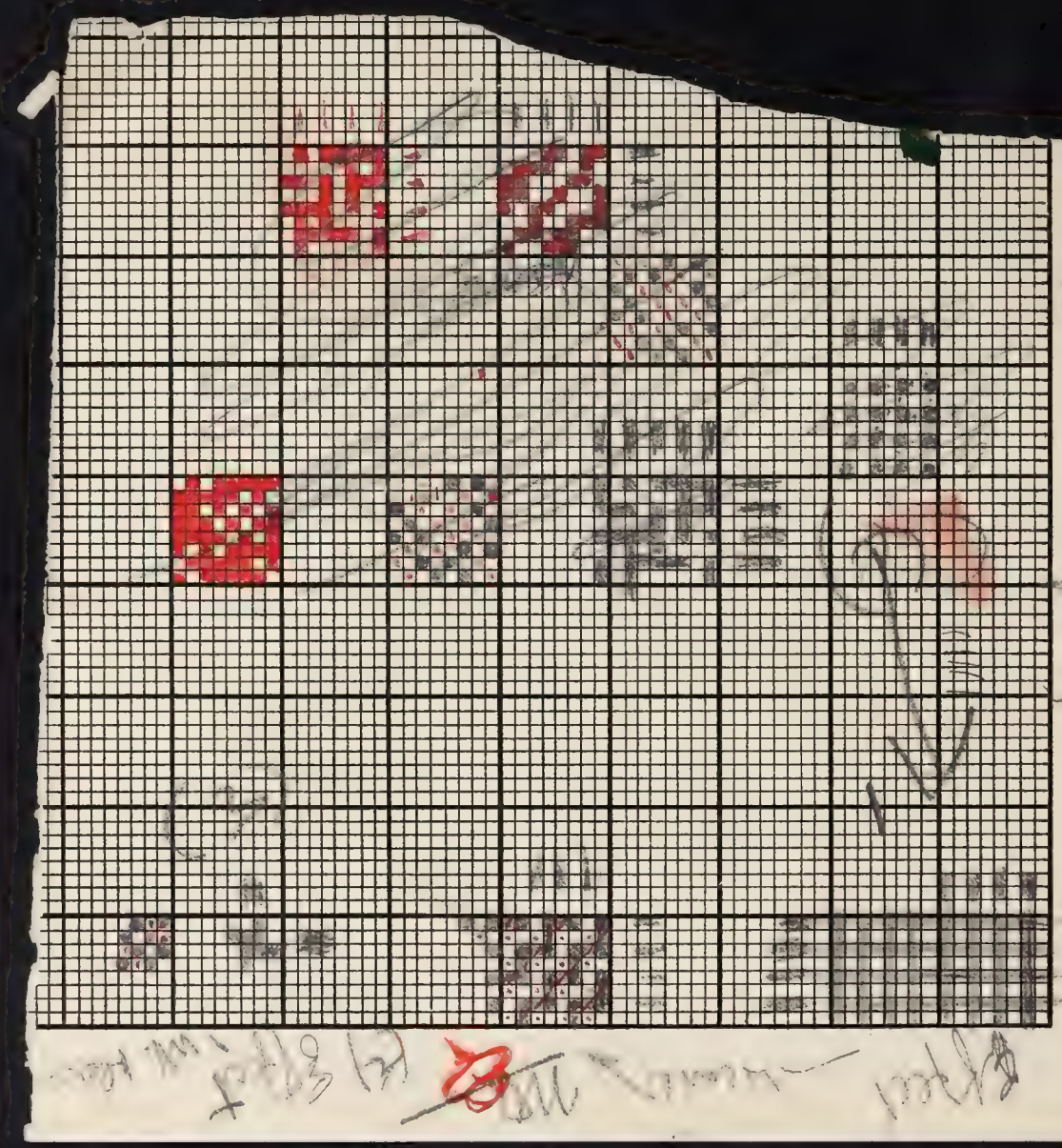


FOR (a) + (b), CUT EACH PICK TWICE.
1st. CUT ALL BUT RED.
2nd. CUT ALL BUT BLUE.

EXTRA WARP FIGURING.

BOTANY GROUND.

SILK FIGURE.

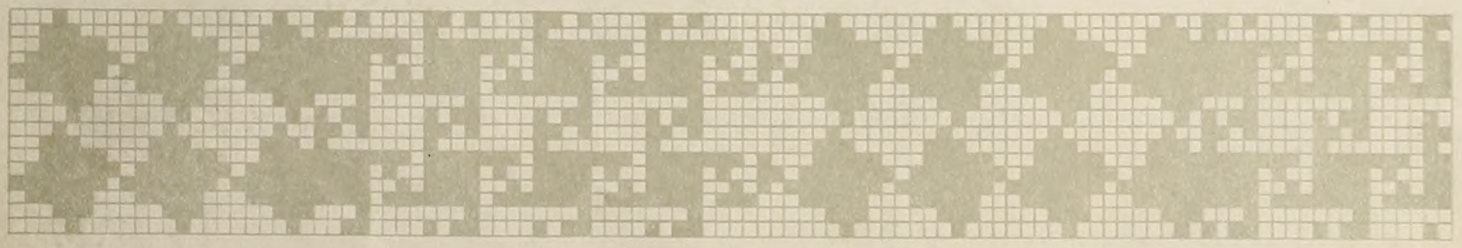
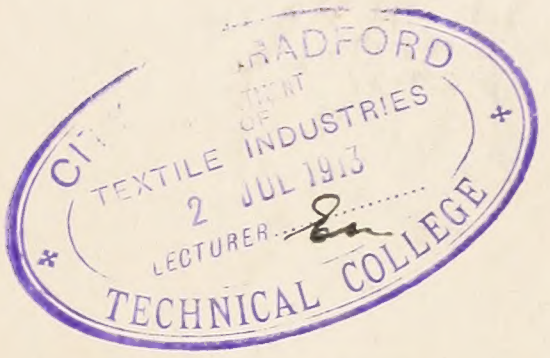


City of Bradford Technical College.

DEPARTMENT OF TEXTILE INDUSTRIES.

COLOUR SHEET No. 2.

P 3160—500.



Nov 23 1912 Ea